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AUTHOR Hayman, John L., Jr.: And Others
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ABSTRACT

Prepared for top and middle managers, this paper represents a comparative overview of management information system development in 40 state departments of education. Questionnaires elicited information about the background of participating agencies as well as conceptual concerns, the planning and implementing of MIS data collection, data processing, and information delivery. Specific conclusions drawn from this study and some of their implications are discussed together with a complete description of the survey. Appendices include the MIS questionnaire, data in table form, a key relating the questionnaire to sections of the paper, and definitions of terms. (Author/RBA)

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THE STATUS OF MANAGEMENT INFORMATION SYSTEMS
(MIS) IN STATE DEPARTMENTS OF EDUCATION
NATIONAL SURVEY

ALABAMA STATE DEPARTMENT OF EDUCATION
STATE OFFICE BUILDING
MONTGOMERY, ALABAMA
FEBRUARY, 1973

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John L. Hayman, Jr.
Project Director and
Coauthor

Janet N. Bacon
Senior Author

Reynolds Ferrante
Technical Advisor

Sherman Taffel
Writing Assistant

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To all SDEs who cooperated in filling out the lengthy questionnaire. The high response rate (42 out of 50) indicates a great degree of concern by State Departments about the development of their information services.

Participating States:*

Alabama
Alaska
Arizona
Arkansas
Colorado
Connecticut
Delaware
Florida
Georgia
Idaho
Illinois
Indiana
Iowa
Kentucky

Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Nebraska
New Hampshire
Nevada
New Jersey
New Mexico
New York

Oklahoma
Oregon
Pennsylvania
North Carolina
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
West Virginia
Wisconsin
Wyoming

* Two of the above states returned their questionnaires too late to be used in the tabulation.

THE STATUS OF MANAGEMENT INFORMATION SYSTEMS (MIS) IN STATE DEPARTMENTS OF EDUCATION

ABSTRACT

Overview

This paper* has been prepared for top and middle management to provide a general description of current Management Information Systems and their application within state departments of education in the United States, and to give an overall view of the status of MIS development. Questionnaires were sent to all states, and responses came from the persons most knowledgeable about MIS development. Forty-two questionnaires were returned, of which forty arrived in time to be included in this study.

Purpose

The paper provides information for comparing a state's own MIS development with overall MIS development in state departments of education. Also, it addresses areas of major concern in MIS efforts, including: the principle concepts required to understand an MIS; a description of information services in SDEs; and planning and implementing MIS data collection, data processing, and information delivery. Following is a short description of these areas, along with significant conclusions on MIS developments and on constraints which inhibit the achievement of the most desirable information system activity.

Conclusions

Most (32) of the forty SDEs which responded to the questionnaire are making major or minor revisions in their existing MIS or are developing a new system. Widespread developmental activities, therefore, are under way; results indicate that most of these activities are handled by inhouse staff. Some recognition of the importance of these activities and of the systems they are intended to produce is evidenced by the fact that twenty-nine states have a unit which has the term *management information* either in its title or in a written statement of its major responsibilities.

Sixty-five percent of the states indicate that their information services are being planned to be responsive to management needs. A wide variety of assessment procedures have been employed across all levels of management to determine user needs.

Most states do not have completely centralized information services; many (24) do have centralized data processing. A large percentage of the budget for data processing goes for "housekeeping" types of activities (accounting/budgeting, personnel statewide, facilities/property/inventory). A greater percentage of data processing is manual rather than automatic; the most heavily automated functions are accounting/budgeting and personnel statewide, "other," and test processing and reporting. A majority of states would like to increase automation of those functions which are now least automated, and the desire for increased ADP is widespread among SDEs.

A strong attempt is being made to improve data collection procedures, and some success is evident in this area. Many states have or are planning forms control and have completed a forms analysis in the last year. Many have an active mechanism for minimizing burden on data sources and eliminating unnecessary duplication. A number of

* The complete paper to which this abstract relates is available from the Management Information Project, Alabama State Department of Education.

editing checks are used on source data. On the average, SDEs indicate they have achieved a high degree of quality control on input. In general, results indicate that data collection is an area receiving a good deal of attention and in which progress is being made. Experience indicates, however, that forms proliferation and duplication in data items collected remain a major problem, and that the articulation of data input with user-determined information output remains weak in most states.

The delivery of information from the system to users is handled primarily in the form of written reports. In their information delivery efforts, SDEs feel highly successful with middle management and moderately successful with top and line management and with LEAs. Relevant content, clarity, and proper format appear to be the least difficult information output characteristics to achieve, while comprehensiveness, accuracy, and timeliness are the most difficult. SDE information systems get a number of unscheduled requests from a variety of users; easy ones (data already in data base) take an average of five days to fill; difficult ones take an average of thirty-five days. Questionnaire results indicate that filling unscheduled requests for information is not considered a major problem at SDE level; this is in contrast to reports in the literature that unscheduled requests often constitute one of the greatest difficulties in MIS. Most federal reporting is handled through the information system of the SDE, and not directly from the LEAs.

There are, however, serious constraints on MIS development. The data show that SDEs do not have adequate financial support for their system's development, which means they do not have a sufficient number of personnel, especially professional personnel. Also, they do not have the kind of staunch support and involvement of upper management necessary to develop a comprehensive MIS. The implication is that MIS does not have high priority in SDEs, and there is not an adequate understanding of the complexity of information systems or services nor of the difficulty involved in developing a workable system suited to each individual SDE.

Although it is not possible to develop any direct cause and effect between the relatively low priority of MIS and other constraints on MIS development in SDEs reported in the data, the other constraints are evident. Most SDEs are in some phase of development of an MIS. Sixty-five percent of them indicate their system is being designed to serve user needs, although the effort to identify those needs does not seem to be high. Only seventeen of the forty SDEs have training programs as part of the developmental effort. Though most SDEs are working for forms control, on the average, only 1.3 full time equivalents (FTEs) are devoted to this task. Further, the average number of professional personnel involved in information systems is low, which means there are few people available to plan, implement, and evaluate the systems. The major information delivery mechanism is the written report, and other means tend not to be used at all or to be used inadequately. This suggests, among other things, a low rate of user interaction with the system. Only a handful of states have had a formal evaluation of their information system in the last year. The degree of satisfaction in serving users is only moderate. MISs generally provide minimal service to or interaction with LEAs in MIS planning and delivery, though, of course, a good part of the input data comes from local agencies.

The plans for regional centers vary widely, with a good deal of enthusiasm for the regional concept. Only three of the forty states have regional centers in operation, however.

The implications of the data are that information systems in SDEs span the continuum of first-generation (non-computerized), second-generation (computerized handling of data without an integrating system), and third-generation systems (consolidation of separate functionalized systems through a data base with relatively little attention to coordination or redesign of output for users).

Clearly, a great deal remains to be done to develop optimally useful information systems in state departments of education. A fourth-generation system, one which will: (1) serve decision-making throughout the entire organization, including the highest management levels; (2) have committed to it sufficient resources for this wide-ranging service function; (3) represent an integration of all of the information system activities and components in an SDE; and (4) have the commitment, attention, and involvement of top management; does not appear to exist at this time in any SDE. Progress is being made in many areas, but the rate appears to be slow in light of the rapidly increasing demand for greater efficiency in the operation of educational systems.

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PURPOSE OF THIS PAPER

Many state departments are, have been, or will be involved in developing an MIS. This development will require large expenditures of resources, both human and financial, throughout the nation. An operational MIS could ultimately provide more effective education because it could provide timely and accurate information with which to evaluate, monitor, and develop new programs and activities.

Yet, very little information is readily available for state departments to use to help them to make day-to-day practical decisions about the development of an MIS in their own states. Little understanding of the nature or purposes of an MIS has been disseminated for SDEs to use to guide their decisions about the nature of their own MIS.

This paper is not meant to sell one concept of MIS nor does it profess to offer *the* word on MIS in individual state departments of education. In handling the questionnaires it became quite clear that each SDE has unique needs, constraints, and goals which have and will continue to affect the way in which it serves its own needs and the needs of its constituencies. A status paper is valuable for its attempt to get a general idea of what is currently true in MIS. What you read will not sound exactly like your own SDE, but, hopefully you will gain evidence of general trends.

This paper is sponsored by the Alabama State Department of Education as part of a Tri-State Project to aid their own and other SDEs to design and implement an MIS.

Dr. John Hayman, technical consultant to the project, and his staff at CREWS (Center for Cooperative Research With Schools) at The Pennsylvania State

University, together with information, education, and questionnaire specialists, developed a questionnaire which was sent to the fifty states. (See Appendix A.)

The questionnaire was filled out in each state by the person or persons most knowledgeable about information services in each state department. It is the intention in this paper to use questionnaire results to provide a *description* of the contemporary decisions related to and applications of Management Information Systems and their components within State Departments of Education (SDEs) in the United States.

Such descriptions of information systems in SDEs serve as a resource to SDEs in planning for MIS development because they help provide:

1. A knowledge of MIS terms and components.
2. An understanding of the purposes and functions of an MIS.
3. An understanding of the role an MIS *could* play in SDEs in development, program planning, and monitoring.
4. A knowledge of the present state of development of MIS in other SDEs as a yardstick for evaluating their own present development.
5. A knowledge of successes and trends as a basis for planning.
6. A knowledge of problems to avoid.

PLAN FOR READING THE PAPER

This paper has six sections. The general content of each section is explained following the title of the section below:

- I. Introduction to Information Systems.
Explanation of the concepts, purposes, components, and operation of an MIS.
- II. Introduction to Information Services in State Departments of Education.
Overview of SDE approaches to IS and the description of the choices of SDEs in the development of information services in their state.
- III. Planning and Implementation.
The type and extent of planning which is or has been conducted in SDEs for development of an MIS.
- IV. Data Collection.
Description of SDE choices and current practices in data collection services.
- V. Data Processing.
Description of SDE choices and current practices in data processing.
- VI. Information Delivery.
Description of SDE choices and current practices in supplying information to users.

Each section begins with a list of questions which the section will answer. Each of these is repeated in the part of the section in which it is discussed. A summary of the entire section concludes each section.

Sections II-VI of this paper are the sections based on the questionnaire which was sent to the fifty states. The titles of these sections are the titles of the questionnaire sections. However, the length and detail of the questionnaire made it necessary to collapse questions

in reporting the results. The key to the correlation between questionnaire and paper sections is presented as Appendix B.

The plan of Sections II-VI is:

1. Statement of areas to be covered in the section;
2. Questions following from the areas;
3. Answers to the questions in the form of:
 - a. A table summarizing results and/or;
 - b. A narrative summarizing the results;
 - c. Discussion of the implications of the table or the narrative.
4. Section summary.

Tables

For most tables, N represents the number of states answering a question or part of a question. Because many SDEs indicated no response or information lacking (IL) for parts of or all of certain questions, the total N (out of forty possible respondents) for the question or part of the question is often less than forty. Total N for the question is indicated in the lower left-hand corner of the table; N for *each cell of a question*, if it is different than *total N for the question* is indicated in the cell containing the response. In such cases, columns do not add in any direction to total N for the question. To remind you of this fact, a note below the table will indicate $n \neq N$. Tables based on percentages are so indicated. Where it is helpful for purposes of interpretation, columns are added vertically or horizontally. Where percents do not add to 100, a notation, $T \neq 100$ is entered at the bottom of the table. N = number of states responding to a question; n = total number of responses; X = average of data for that table; R = range (lowest to highest) of amounts.

1. INTRODUCTION TO MANAGEMENT INFORMATION SYSTEMS (MIS)

This section attempts to answer the following questions:

- A. What are Data? What is Information?
- B. What is a Management Information System? What is its Purpose?
- C. How does an MIS operate?
 - 1. How Does an Ideal MIS Operate?
 - 2. How Does a Dynamic MIS Operate?
- D. What is the Difference between a Fourth Generation MIS and a Third Generation MIS?
- E. Summary

A. What are Data? What is Information?

The daily use of computers to manipulate data in businesses, service organizations and research organizations has enabled tremendous growth throughout the society. There are virtually no organizations that are not in some way affected by the management of information. We have a new concept of what information is. Information is not just "data" or "ideas:"

Information is the meaning or intelligence that is derived from data and used for management decision. Information is the measure of the relevance and value of data for management decision and control. (Kriebel and van Horn, p. 19)

For example, today upper management can look into pupil files and find out how many students are reading below norms for their grade level or how many teachers are or are not certified. This information can be used to change, rearrange, or keep a certain practice or program district-wide, county-wide, or statewide. This could allow for better management of the whole school system in a state where such management was not before possible.

Current thinking about and use of information implies a whole series of steps, "a chain of *information services*: *inquiring, data storing, encoding, transmitting, decoding, deciding.*" (Marschak, p. 79). This chain may be in separate pieces, in which case it comprises a number of information services; it may be connected in parts or *in toto* to form an information system. If this system is designed to serve management's needs in various types of decision making, it is a *management information system*.

B. What is an Ideal Management Information System? What is its Purpose?

A management information system is:

The formal configuration of human and capital resources and programs in an organization that results in collecting, encoding, storing, processing, retrieving, communicating, decoding, and using data for management decision and control. The main purpose of the definition is to focus attention on the key characteristics: *formal configuration, resources—human and capital, programs, information processing activities, management decision and control.* (Kriebel and van Horn, pp. 16-17).

A management information system must be a *formal configuration*. This means it has to have some definite, agreed-upon pattern. It cannot be separate, nonintegrated pieces, even if it does start out that way. This configuration is made up of three subsystems: an input subsystem, a data management subsystem, and an output subsystem.

- 1. An *Input Subsystem*, in which raw data from the field are collected; checked for completeness, validity, and reliability; and fed into the data management subsystem. Data collection forms are a part of the input subsystem, and this subsystem provides the MIS-source interface.

2. A *Data Management* Subsystem, in which data are classified, processed, stored in appropriate files, analyzed and manipulated in various ways, and fed to the output subsystem. Computers and other data processing equipment comprise a part of (though not necessarily *all* of) the data management subsystem.
3. An *Output* Subsystem, in which information is retrieved from the data management subsystem, placed in proper format, and fed to the various users. Note that this subsystem provides the MIS-user interface and thus is crucial in determining impact of the MIS on various decision processes.

In an MIS these three subsystems have the purpose of serving management decision making and control.

C. How Does an MIS Operate?

1. How Does an Ideal MIS Operate?

Operation of an MIS might be portrayed graphically as in Figure 1. It is described on the following page.

Certain relevant events in the real world are identified and translated into data, that is, into quantifiable, symbolic form; these are then encoded, a process which involves checking (editing) for certain characteristics (validity, file compatibility, etc.) and planning them in formats suitable for data processing; then they are fed as input into a data management system. Some encoding activities may be performed by the formal data management system, and some may occur prior to input into this subsystem. As indicated above, within the data management system, processing, analysis, and other manipulation of the data will occur. At the other end, data are taken from the system, put into a "communicating" format, and fed as information into the decision process. Decisions are translated into actions which affect some relevant subset of real world events. A feedback loop, through which users can make requests of the system, is shown. The total process is continuous, of course, with the input subsystem sensitive to the effects of the actions on events.

This is an idealized system, and the problems in operationalizing it are so severe that a comprehensive operating model in an organization of any size does not

appear to exist. Progress has been made recently in the "middle" activities, that is, in the set of operations which comprise the data management system. Problems exist at either end, though the greatest appear to be in making the MIS interface with and impact the decision process. This difficulty relates to the complexity of the management and control structure and of related decision processes in organizations of any size.

2. How Does a Dynamic MIS Operate?

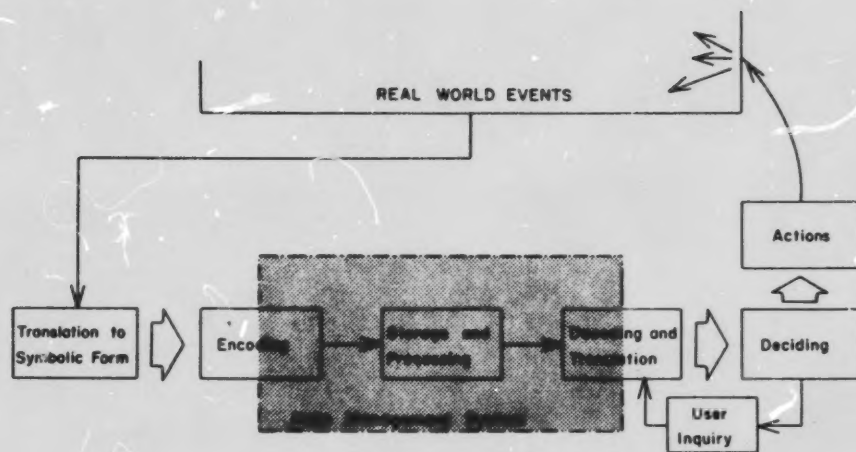
Let us consider a management information system in a less idealized way. Experience has shown that the picture presented in Figure 1, in which the MIS appears fixed, and only events outside of it are subject to change, is oversimplified. In fact, MIS operations are a subset of the real world events which are observed, and some of these operations must be directed toward the MIS itself. This is true for three reasons: (1) initial MIS development never results in outputs which fully meet decision needs, so that long-term developmental activity (an evolutionary approach) is essential; (2) organizational needs and functions change over time, and the MIS must change with them; (3) technological changes require that the system must be updated. The information system is embedded in a larger system; therefore, it must continuously feed back information on its own performance, and it must change accordingly.

A graphic representation of a dynamic MIS is given in Figure 2. This figure shows the interaction of MIS planning and operation. Experience indicates that, to get the dynamic quality necessary, this type of split is probably necessary, with decision authority in a person who supervises both segments of the system and who is aware that the basic criterion for the MIS is its ability to impact management decision and control processes in a recognizable and positive way.

D. What is the Difference between a Fourth Generation MIS and a Third Generation MIS?

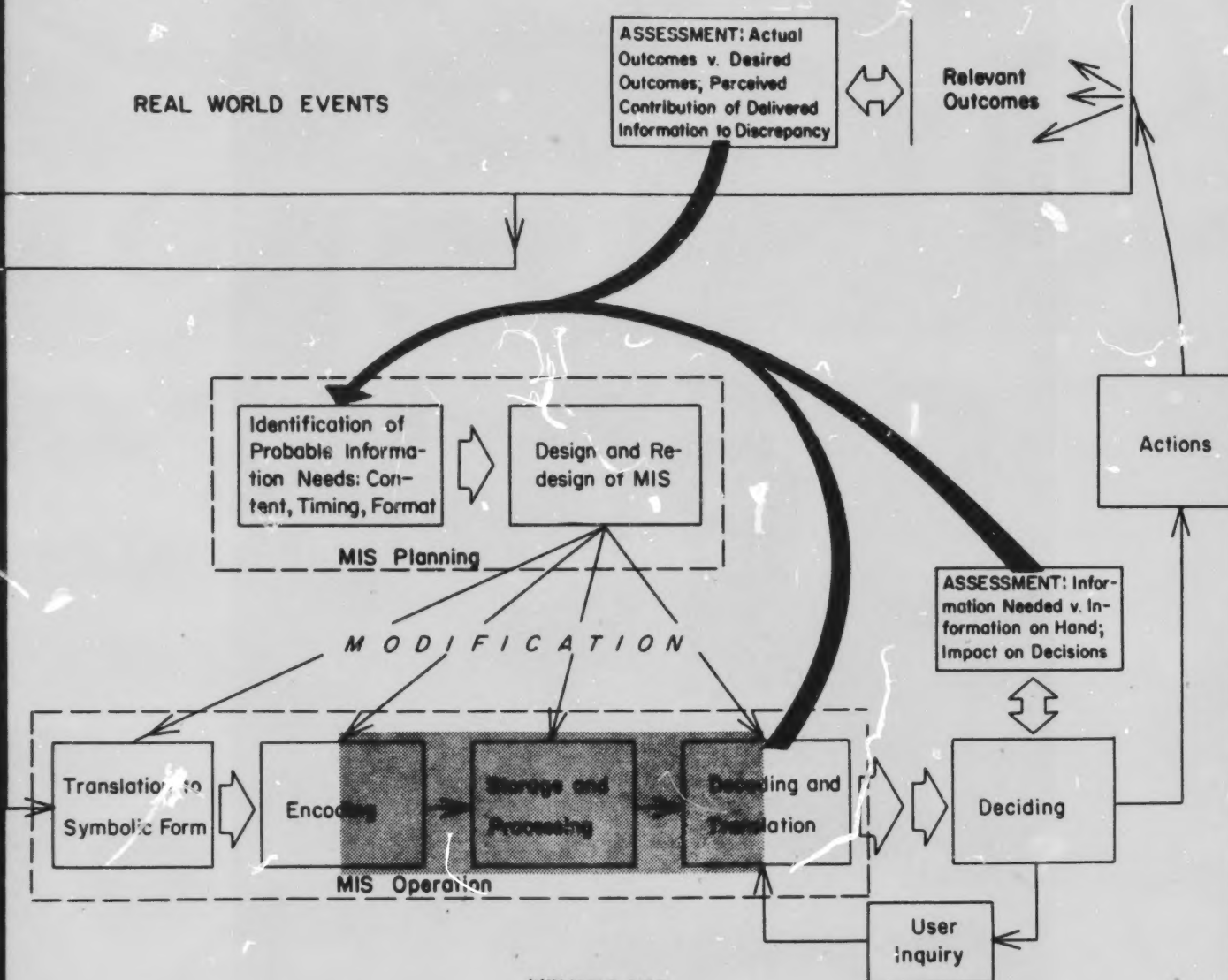
The preceding concept of a dynamic MIS constitutes "fourth generation" thinking about information systems. This concept is beginning to replace the third generation concept, developed in the mid to late 1960s, which is still being used for the most part. These systems were characterized by:

a move towards consolidation of the separate functionalized systems. The set of



MIS OPERATION

Figure 1.



DYNAMIC MIS

Figure 2.

management function models were imbedded in a *data base* model that stressed data processing efficiency and effectiveness. The development orientation focused on a corporate data bank. This framework stressed input data format, flows, and files with relatively little attention to coordination or redesign of output information and end users. (Kriebel and van Horn, p. 23).

In contrast, fourth generation information systems, which will emerge in the 1970s, will utilize fourth generation computer technology and will be based on critical decision processes in the organization. They will serve the highest levels of management as well as other parts of the organization. They will require the attention and involvement of all intended users, particularly that of top management, lack of which Kriebel and van Horn (1971, p. 24) state has been a conspicuous issue inhibiting fourth-generation MIS development to date. The chief purpose of these systems will be to aid implementation of organizational goals. This, rather than the amount of activity generated by the tasks involved in getting the data in, through, and out of the system, must be the criterion of value by which to judge the value of the MIS.

Churchman makes the point in this way:

... one cannot use the amount of physical activity as a measure of performance of a system. One has to show how the activity is translated into a measure of utility or value. Computer-based information systems have tended to fail because their measure of performance is in terms of the transaction, rather than the benefit. The true benefit of an information system must be measured in terms of the meaning of information for the user (1968, pp. 108-112).

The measure, he says, comes by balancing the improvement in the user's behavior as a result of having the information against the cost of gaining the information.

E. Summary

To summarize, organizational efficiency in the last quarter of the twentieth century will require development of a fourth generation information system,* and this means among other things that:

1. The MIS will be oriented toward management decision and control and will serve the entire organization, including the highest management levels.
2. A formal system will be required, and to it must necessarily be committed sufficient human and capital resources for its design, development, operation, and improvement.
3. The system will consist of a chain of services or activities, beginning with inquiry (the translation of relevant real-world events into inputs) and ending with support of decisions. Traditional data processing is a subsequence within this larger chain, and it must be made to function as an integral part of the larger chain.
4. The commitment, attention, and involvement of top management in the design, operation, and improvement of the system will be essential.
5. The technology and theory necessary for development of a model system now exist.

These current ideas about fourth generation, dynamic management information systems provide the basic framework on which the original questionnaire for this study was based, and they provide the framework for the descriptions of MIS development in state departments of education in the next five sections. Individual state departments may agree more or less with the specifics in the ideas presented. There can be little disagreement, however, that the general purpose of the MIS is to help improve the operation of state educational systems and that a real challenge in doing this lies ahead.

The next five sections of this report are organized as follows:

II. Introduction to Information Services in State Departments of Education:

* First generation information systems used mostly unit data processing (non-computer) equipment. The second generation was characterized by the first uses of computers as MIS components. The various information functions developed separately, usually without coordination and without compatibility among components.

What are the important general aspects of MIS development and operation? Is there an MIS unit? Is there a significant amount of resources committed to the MIS? What are the present problems in developing an MIS? Is top management committed?

III. Planning and Implementation:

Who was involved in the planning? Were the users involved? Were their needs considered?

IV. Data Collection:

V. Data Processing:

VI. Information Delivery:

At what stage of development are each of these three major subsystems of information services in SDEs?

This paper cannot hope to answer all of these questions definitively, nor does it aim to do so. It aims to provide description of past, present (and some possible future) actions in these areas as reported by forty SDEs. Hopefully, this description will guide SDEs in fulfilling their own challenge in the way best suited to each individual state department's needs and constraints.

II. INTRODUCTION TO INFORMATION SERVICES (IS) IN STATE DEPARTMENTS OF EDUCATION

In order to better visualize the contemporary developments and applications of information systems in state departments of education, it is necessary first to describe some general aspects of current information services development.

Six facets of this general area were approached in the questionnaire:

- A. Centralization: Is the management information system completely centralized, with all data collection, data processing, and information delivery responsibilities in one unit?
- B. MIS Unit:
 - 1. Is a separate unit responsible for and/or planning for management information needs?
 - 2. What are its goals and objectives?
- C. Place of MIS in organizational structure of SDE: How does the MIS unit fit into the organizational structure of the SDE?
- D. Resources and Support: What amount of resources and support does the management information unit receive?

E. Competencies of person responsible for MIS development: What competencies are considered important for the MIS leadership position to have?

F. Problems: What major problems are experienced in attempting to design and develop a system of information services?

Each question will be discussed in turn.

A. Centralization: Is the management information system completely centralized, with all data collection, data processing, and information delivery responsibilities in one unit?

In seven of the forty SDEs, the management information system is completely centralized, with all data collection, data processing, and information delivery responsibilities in one unit. Of the remaining thirty-three SDEs, *processing* is highly centralized, with twenty-four of the SDEs having a single data processing unit. Half of the twenty-four own or purchase services; the other half secure services from a (more centralized) state government data processing system. Three others have a single unit which uses a combination of owning/purchasing and securing from a (more centralized) state government data processing system. Only six SDEs have two or more separate data processing units.

Data collection, on the other hand, is not as highly centralized as data processing:

1. One SDE utilizes a single unit for all data collection;
2. In twelve SDEs, the majority (but not all) of data collection is handled by a single unit;
3. In ten SDEs, a single unit has a data collection responsibility but handles less than half of the SDEs data collection activities;
4. In eight SDEs, each division is responsible for its own data collection;
5. In one state, one unit plans for all data collection but most actual collection is handled by the originating unit; in another, a single unit handles the majority of all collection and the clearance of all forms.

These responses indicate that few SDEs have accepted a high degree of centralization of information services; only one-fifth of those responding were centralized. For the remaining four-fifths, data processing is much more centralized than data collection probably because of the early creation of data processing units which have since become permanent structures in SDEs. Since existing structures are relatively difficult to change, any development of MIS will have to find workable methods of putting this centralized data processing to its best use. Whether the decentralization of data collection, on the other hand, may be an asset in terms of flexibility or whether coordination and centralization may be the most efficient means of data collection has to be determined by each SDE.

B. MIS Unit:

1. Is a separate unit responsible for and/or planning for management information needs?

Of the forty states, twenty-nine have a unit within the SDE which has the term management information either in its title or in the written statement of its major responsibilities; of the remaining eleven, eight are planning for a management information unit, three are not. In other words, all but three states have or are planning for a unit with specific management information responsibilities.

Of the twenty-nine states with a management information unit, twenty-one have a planning component within the unit. Seventeen of these have a separate subunit for planning. Of the remaining eight, seven are given planning support elsewhere in the SDE, generally by the Planning and Evaluation or Planning Research and Evaluation unit. (One SDE did not respond to the question.)

It can be noted that a number of the units involved in management information also are involved with a number of areas besides planning and operation of an MIS: e.g., five units combined their efforts in management information and systems, eleven combined planning and evaluative efforts, and two involved assessment functions with their planning units.

2. What are its goals and objectives?

The goals and objectives of the unit responsible for MIS ranged from very broad objectives such as, "To expand (or develop or revise) the Management Information System for the Department of Public Instruction and all other agencies of government, local school administration and others," to very specific objectives such as, "Initiate system of computer reporting of twenty-one data items regarding each certificated school district employee in the State." An analysis of the objectives reported indicates the following general goals:

- a. To develop, expand, or revise information services or systems; few states actually called this effort the development of an MIS;
- b. To develop, expand, and/or revise the information services aims in order to support: (1) the goals and activities of specific *divisions* (notably planning); and (2) or the *total* SDE, as a liaison to OE and to other agencies or as a support for decision making;
- c. Development of targeted sub-components of the whole information system, i.e., to eliminate duplication, to establish uniform data files, to consolidate reports, and to provide timely reporting of information.

These goals and objectives are consistent with the focus of the units as indicated by their titles and the roles of the administrative heads of the unit. These roles also indicate the operational level of the information services. In the forty states, the role titles are:

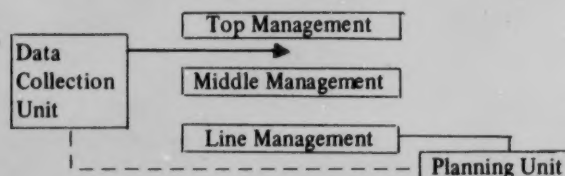
Director - 50.0%
 Supervisor - 19.4%
 Coordinator - 19.4%
 Administrator - 11.2%

This distribution indicates a considerable variation in level of information service unit head, though the director position is used more than any other.

C. Place of MIS in organizational structure of SDE:
How do the management information services fit into the organizational structure of the SDE?

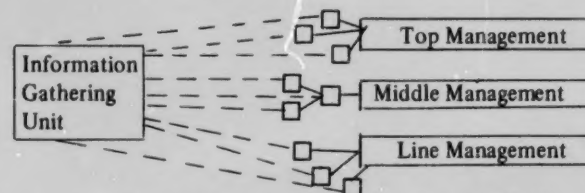
Rather than trying to provide a "typical" structure to answer this question, it is more appropriate to categorize the information services units in SDEs by their clients and their functions in dealing with the whole SDE operation. The units are utilized at the top, middle, and lower levels of management, some for decision-making focuses; some for planning, evaluation, research, and assessment; and some for statistical services. What is clear is that there is no typical application of information services across the country. However, some generalizations are possible, and three typical types of organizational structures are shown below.

1. There are applications closely following computer development; an example would be a data collection unit plugged in at some level of management to serve as a resource for other divisions of the Department as a whole, notably planning and research.

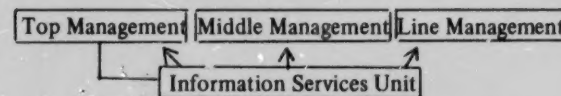


2. There is some movement toward centralization of the various components of

information gathering to serve as a resource for divisions whose focus is other than information services.



3. Some states are moving toward an application of information services in a more formal operational procedure in management decision making and SDE management.



The overall trend seems to be oriented toward development of some type of clearly identifiable information system and of formalizing the responsibilities of information services within the SDE.

These trends seem to be dependent upon a number of factors, perhaps the most critical of which is the amount of total resources available for the development of such systems; another is the level of internal management staff support. This brings us to the fourth area of primary concern, the amount of budgeted funds available for information services.

D. Resources and Support: What amount of resources and support does the MIS unit receive?

The amount of funds available in each state for the MIS unit for fiscal years 1972 and 1973 respectively is shown in Table 1.

The chart indicates that the average amount spent from state sources in 1972 was \$272,612. This amount decreased slightly in 1973 to \$271,474. Average federal support is high for both years: \$151,859 for 1972, \$154,936 for 1973. The overall levels of state and federal support appear to be holding constant.

What the averages do not show is that from 1972 to 1973 state support went up for ten states, down for four states, remained constant (or had minor increase) for four states, and began for four states.

TABLE 1

Amount and Source of MIS Funds*
1972 and 1973

Amount From							
<u>State</u>		<u>Federal</u>		<u>Other††</u>		<u>Total</u>	
1972	1973	1972	1973	1972	1973	1972	1973
$\bar{X}$ =272,612	$\bar{X}$ =271,474	$\bar{X}$ =151,859†	$\bar{X}$ =154,936	$\bar{X}$ =124,340	$\bar{X}$ =179,156	$\bar{X}$ =314,606	$\bar{X}$ =363,715
R=9,000-900,000	R=1,500-972,778	R=29,124-397,955	R=28,000-451,943	R=30,000-299,787	R=3,312-355,000	R=30,000-1,085,000	R=28,000-1,192,492
N=19	N=22	N=27	N=27	N=3	N=2	N=28	N=30

N = Number of SDEs

 $\bar{X}$ = Average

R = Range (lowest to highest) of amounts

*One state reporting has no separate MIS budget; budget is made by contribution of participants.

†This average includes \$190,000 of available federal money which was not spent.

††The source of "other" was not indicated except for one state which has a working capital fund. It had to be left out of the 1973 average because the amount for FY 1973 had not yet been determined.

During that same time span, *federal* support went up for nine states, down for eight states, remained constant (or had minor increase) for eight states, began for one state, and ended for two states.

The level of management support given to information systems in the SDEs is shown in Table 2.

The questionnaire respondents, who were the person or persons most knowledgeable about information services in their SDEs, seem to feel that the state and deputy superintendents give either very high or high support for management information efforts. Top management's support falls almost evenly in the three top categories, while middle and line management and LEAs give either high or moderate support.

This may indicate a problem. The top support seems to come from the state superintendent and his deputy, indicating that the MIS development may be mainly their idea. Other management, especially middle and lower levels, does not appear to support as strongly. These people will be both suppliers of data and intended information users, however, and their relatively lower level of support could signal a problem area.

At this time, the mean number of full-time equivalent (FTE) personnel working in different components of information systems is respectively as shown in Table 3.

This table shows clearly that the greatest concentration of FTE personnel is non-professional-technical, with 50% more of such personnel being involved in manual data processing than in automatic data processing. Clerical-secretarial personnel are the second largest group; professional permanent are next, followed by very low numbers of professional temporary. These data indicate a domination of information systems by non-professional personnel, a situation which could tend to retain the status quo of third-generation (and possibly second-generation) information services. The figures also indicate little access to personnel outside the SDEs.

In respect to concentration of personnel by areas of function, non-professionals are most concentrated in manual data processing, professionals in automatic data processing though, as pointed out above, their total numbers are significantly lower than non-professional personnel. Noteworthy is the low number of professionals involved in SDE planning and evaluation of the information system.

E. Competencies of person responsible for MIS development: What competencies are considered important for the person who holds leadership in MIS to have?

The relative expertise levels for the following competencies were rated by the person primarily responsible for information services in SDEs as shown in Table 4.

From Table 4 it can be noted that those competencies valued by the respondents* as essential are:

1. Knowledge of SDE needs and problems;
2. Knowledge of information flows in the SDE;
3. Experience in Information Services.

Those competencies valued as highly important are:

4. Knowledge of data analysis techniques;
5. Administrative training;
6. Administrative and/or teaching experience in the schools.

Those competencies valued as important are:

7. Knowledge of availability and capabilities of various equipment;
8. Knowledge of manual IS procedures;
9. Knowledge of Automatic Data Processing operation.

"Other" attributes mentioned as essential are: interpersonal relationships, knowledge of LEA and legislative information needs, project control techniques, systems development skills, systems planning skills, management training, salesmanship, background in systems theory, and knowledge of social systems and their relationships in an SDE.

*Recall that the respondents filling out the questionnaire are the person or persons most knowledgeable about information services in the SDE.

TABLE 2

Percentage Level of Management Support
for Information Systems

<u>Level of Support</u>	<u>State Supt.</u>	<u>Deputy Supt.</u>	<u>Top Mgmt.</u>	<u>Middle Mgmt.</u>	<u>Line Mgmt.</u>	<u>LEAs</u>	<u>$\bar{X}$</u>
Very High	42.5%	50.0%	30.8%	13.5%	15.2%	11.4%	27.3%
High	32.5	30.6	30.8	40.5	45.5	37.2	36.2
Moderate	27.5	13.8	28.2	40.5	33.3	32.4	27.4
Low	2.5	5.6	7.7	2.8	3.0	11.4	5.5
Very Low	<u>5.0</u>	<u>---</u>	<u>2.5</u>	<u>2.7</u>	<u>3.0</u>	<u>8.6</u>	<u>3.6</u>
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	N*=40	N=36	N=39	N=37	N=33	N=35	

*N=number of states out of a total N for this question of 40

TABLE 3

Full-Time Equivalent Staff
in Information Systems

Area Function	Professional		Non-Professional	
	Permanent	Temporary	Technical	Clerical-Secretarial
Automatic Data Processing	$\bar{X}=9.6$ R=1-42 N=34	$\bar{X}=1.5$ R=1-2 N=4	$\bar{X}=10$ R=0.5-42 N=26	$\bar{X}=6.9$ R=1-19 N=28
Manual Data Processing	$\bar{X}=4.2$ R=1-10 N=15	$\bar{X}=3.5$ R=2-5 N=2	$\bar{X}=15$ R=0.5-63 N=10	$\bar{X}=9.3$ R=1-75 N=13
SDE Planning for IS	$\bar{X}=2.2$ R=0.3-5 N=20	$\bar{X}=1.0$ R=0.2-2 N=4	$\bar{X}=1.5$ R=1-3 N=4	$\bar{X}=1.0$ R=0.5-2 N=7
Evaluation IS	$\bar{X}=1.5$ R=0.1-5 N=10	$\bar{X}=1.0$ R= N=2	---	$\bar{X}=0.9$ R=0.5-1 N=4
Other IS Operations	$\bar{X}=3.7$ R=1-11 N=7	$\bar{X}=3.0$ R= N=1	$\bar{X}=5.0$ R=1-14 N=4	$\bar{X}=2.7$ R=1-6 N=6
Other	$\bar{X}=1.5$ R=0.5-3 N=3	N=0	$\bar{X}=23$ N=1*	$\bar{X}=7.3$ R=2-15† N=3

N = Number of states responding to this cell of the question

 $\bar{X}$ = Average number of personnel

R = Range (lowest to highest) of amounts

†Includes 15 clerical-secretarial who serve LEAs

*Serves LEAs in one state

TABLE 4

Competencies Needed by Leadership Position
in Information Systems (in percent)

<u>Competencies</u>	<u>N</u>	<u>Essential</u>	<u>Highly Important</u>	<u>Important</u>	<u>Total %</u>
1. Knowledge of SDE needs and problems	30	73.3%	21.9%	4.8%	100%
2. Knowledge of information flows in the SDE	40	57.8%	32.2%	10.0%	100%
3. Experience in Information Services	40	52.5%	37.5%	10.0%	100%
4. Knowledge of data analysis techniques	40	32.5%	52.5%	15.0%	100%
5. Administrative Training	40	25.0%	50.0%	25.0%	100%
6. Administrative and/or teaching experience in schools	40	25.0%	45.0%	30.0%	100%
7. Knowledge of automatic data processing operations	40	22.5%	37.5%	40.0%	100%
8. Knowledge of manual IS procedures	39	25.0%	30.0%	45.0%	100%
9. Knowledge of availability and capabilities of various equipment	40	5.0%	35.0%	60.0%	100%

F. Problems: What major problems are you experiencing in attempting to design and develop a system of information services?

SDEs were asked to rank order of a list of problems encountered in developing an MIS. The results of those rank orderings are shown by Table 5.

The data in Table 5 show lack of understanding and knowledge in the SDE about the complexity of information services and financial restrictions to be the two most important problems in developing an MIS, and these clearly stand out in the rankings from the other problems. Low priority and lack of appropriate planning structure are reported third and fourth respectively. There is little difference in the rankings of the last five problems. Time required and lack of software tie for fifth, lack of outside source of manpower is seventh, underdeveloped hardware is eighth, and lack of models is ninth. Problems one and two may very well be related, with failure to understand the complexities contributing to inadequate funding.

Summary

The data from Section I of this questionnaire lead to the following conclusions:

1. Information services are not highly centralized in SDEs in the United States. Only seven of the forty SDEs in our survey have all data collection, data processing, and information delivery in one unit. Data processing is more centralized than data collection. Twenty-four other SDEs have a single data processing unit. Only twelve SDEs have the majority of data collection in one unit; in another ten a single unit has a data collection responsibility but handles less than half of the SDEs data collection activities.
2. Most SDEs have or are planning a separate unit to be responsible for and to plan for management information. The goals and objectives of these units are generally consistent with their functions. These goals and objectives indicate wide variation in levels of development and commitment to MIS, from a general goal of developing an MIS to objectives related to such specifics as reports consolidation.
3. Management information services fit into the SDEs in three primary ways:
 - a. A data processing unit is plugged into some level of management services as a resource to the whole SDE.
 - b. An MIS unit is planning or operating an MIS to serve the total SDE or to serve a division or two of the SDE.
 - c. Information services are being used to serve as basis for decision making in the total SDE.
4. The level of support for information services development is very high or high among superintendents; diffused between very high, high, and moderate for top management; and high or moderate among middle line management and LEAs.
5. The average level of financial support for both state and federal levels has held relatively constant for FY 1972 and 1973 although it has gone up or down for individual states. State support averaged \$272,612 for FY 1972; \$271,474 for FY 1973. Federal support averaged \$151,859 for FY 1972; \$154,936 for FY 1973.
6. Personnel involved in information services are concentrated in automatic data processing for professionals and manual data processing for non-professionals, with the majority of all personnel being non-professional.
7. The most important competencies the person in charge of administering an information system is expected to have are a knowledge of SDE needs and problems, a knowledge of information flows in the SDE, and experience in information services.
8. The chief problems encountered by SDEs in attempting to develop an MIS are lack of understanding and knowledge in the SDE about the complexity of information services, limited funds, low priority, and lack of appropriate planning structure.

TABLE 5

Major Problems in Developing an MIS
(rank-ordered 1-10*)

Problems	Rank Order Numbers									No Response	Average	Overall Rank
	1	2	3	4	5	6	7	8	9	10		
Lack of under- standing and know- ledge in the SDE about the complexity of information services	12	6	2	4	4	0	1	0	0	6	3.8	1
Financial restric- tions (limited funds)	9	6	4	3	2	1	1	0	1	8	4.5	2
Low SDE priority for developing an information services system	3	3	4	2	3	2	1	0	1	16	6.6	3
Lack of appropriate planning structure in SDE	3	2	2	2	2	1	1	0	0	20	7.0	4
Time required to design a system discourages SDEs from beginning	0	1	3	4	4	2	0	0	1	20	7.6	5
Software lacking	0	3	4	2	0	2	0	6	1	17	7.6	5
Lack of adequately skilled outside source of manpower	3	2	1	3	1	3	4	2	1	15	7.7	7
Hardware not developed enough	3	1	1	1	2	0	2	4	4	17	7.8	8
Lack of models or guidelines	0	2	4	2	1	1	2	1	0	22	7.9	9

N=35

*1 is the most difficult problem

III. PLANNING AND IMPLEMENTATION

In this section, the recent effort of SDEs in the planning and evaluation of information services will be examined. The major areas to be explored respectively are:

A. Responsiveness:

1. Is the plan for information services responsive to management?
2. Were (or are) potential users involved in planning for and/or redevelopment of the information system?

B. Type and extent of planning: What type of planning and/or redevelopment is underway, if any?

C. Personnel involved:

1. Who did or is doing the planning and/or redevelopment?
2. What amounts and proportions of time did each contribute?

D. Training and/or orientation: What training and/or orientation programs have been or are being conducted, if any?

A. Responsiveness to management:

1. Is the plan for information services responsive to management?

Of the forty State Departments of Education, 65% stated that they have a specific plan for making information services responsive to management needs. (This does not appear to be corroborated by the statement of objectives in Section II, incidentally.) These states, plus four additional states, have undertaken extensive analysis of user needs in their planning of information services. The methods that were considered by SDEs to be of relevance in this process were use of questionnaires, interviews, task forces, examination of guidelines and laws, and examination of existing output. Table 6 indicates the extent each method was utilized in identifying the needs of different types of users.

The method most widely used in identifying user needs is examination of existing output followed respectively by interview, examination of guidelines and laws, use of task forces, and questionnaires.

The order of involvement of users in the needs assessment process is: middle management, line management, top management, LEAs, state and federal government. Clearly, the data base for input is being drawn, for the most part, from the experience of management within the SDE. The involvement of top and line management is roughly equivalent to middle management for the interview and the examination of existing output, the two dominant methods. Top and middle management and state governments are almost equally involved in examination of guidelines and laws. Significantly, the involvement of LEAs appears shallow with respect to all methods of user need identification, though the questionnaire is used most often with the LEA.

The degree of effort in this phase was not high on the average. The most frequent activities (interviewing top, middle, and line management and examination of existing output) were used by from 50% to 70% of the thirty states responding to this question.

B. Type and extent of planning: What type of planning and/or redevelopment is underway, if any?

As we have previously indicated, ongoing planning and/or redevelopment has been undertaken by all the states participating in our survey.

States are making or have undertaken minor revisions, major revisions, or complete redevelopment of their information services. The earliest of the current SDE efforts in this respect were begun in 1967. All the states reported their efforts in this area would continue for quite some time. One SDE states, "We cannot refer to our array of information systems in the singular. However, the array is continuously undergoing both major and minor modifications and new systems are being added to the array." Another state is just developing a planning component.

TABLE 6

Methods of Identifying User
Needs in the SDE

User	Question- naire	Inter- view	Task Force	Examina- tion of Guidelines and Laws	Examina- tion of Existing Output	Total
Federal Government	1	1	4	9	11	26
State Government	0	4	3	12	12	31
Top Management	5	21	6	13	17	62
Middle Management	9	22	11	14	18	74
Line Management	8	20	7	9	19	63
LEAs	<u>12</u>	<u>14</u>	<u>7</u>	<u>7</u>	<u>15</u>	55
Total	35	82	38	64	92	

N = 30; n ≠ N*

*In answering this question, respondents checked all of the methods which apply for each user. Each cell in the Table, therefore, has a maximum possible n equal to the total number who responded to the question (N), and column and row totals can therefore exceed N. In this Table and those which follow in the report, upper case N will be used to indicate the number who responded to the question and lower case n will indicate the total number of responses in the Table. N will be given in each case, and in situations like Table 6, where numbers in each question category are independent of each other, n ≠ N will be indicated. When reporting is in percentages, this situation will be indicated as T ≠ 100.

Table 7 indicates the relationships between the type of revision and redevelopment undertaken by the states and the starting times for these efforts.

As we can see in Table 7, six SDEs have chosen minor revisions to their existing systems, nine have major revisions underway, eleven have chosen to develop new systems, and six have chosen some combination of these approaches for different system components. The majority of revisions or developments have begun since 1970.

Of the six states undertaking minor revisions, four reported the time required as "ongoing," one indicated ten months, and one gave no response. For the eleven with major revisions, the number of months projected ranges from ten to sixty, with an average of twenty-five. The range for the eleven new systems being developed is projected to be from twelve to one hundred twenty months, with an average of forty-five months. For other combinations, the range is thirty-six to fifty months, with an average of forty-one.

Current literature in the field of systems planning and development estimates the base period needed for development of a new system at twenty-four to thirty-six months.

C. Personnel involved:

1. Who did or is doing the planning and/or redevelopment?

Table 8 shows the tasks in which potential users were or are involved in the planning and development processes.

The table indicates that upper management has the most involvement in initial planning, with middle and line management having respectively less (though significant) involvement, while LEA involvement is low. Systems specifications are largely middle management directed, and involvement in development of hardware and software is low among these user groups. Training is relatively low for all but especially so for top management and LEAs. Involvement in implementation is about equal for middle and line, with middle dominating evaluation.

As we proceed down the chart beyond the first two upper management dominated items and the second two

technical items, it becomes clear that middle and line management are most involved in operationalizing and improving the system.

Looking at the data another way, the efforts of upper management are most concerned with initial planning and evaluation; middle management with initial planning, systems specification, training, implementation, and evaluation; line management with planning and implementation, systems specifications and training; and LEAs at a lower involvement level with planning, training, implementation, and evaluation. These data indicate a clear differentiation of focus of the different levels of management both in planning roles and operational skills development.

The low involvement of LEAs in planning indicates a system most oriented toward SDE information needs; the high and relatively equal involvement of middle and line management in training and implementation is encouraging as is high involvement of middle management in evaluation. The shallow involvement of upper management in all but initial planning seems to corroborate the possibility of lack of their involvement (see also Table 2, Section II).

2. What amounts and proportions of time did each group contribute to each phase of development? (N is indicated for each cell.)

See Table 9.

Other responses to this question included the following:

We used a departmental task force plus SDAP contracts.

Our development has taken ten years.

We do not use outside people.

We are in initial planning.

Due to the small number of respondents to this question, no broad generalizations are possible. However, some observations are in order.

The largest average time spent in MIS development is for planning. A listing of the individual responses (3, 3, 26, 40, 48, 130, 200) indicates a broad range of man

TABLE 7
IS Revision and Development

<u>Type of Revision</u>	<u>Starting Date</u>			<u>No Response</u>	<u>Total</u>
	<u>Before 70</u>	<u>Since 70</u>	<u>Continuous</u>		
Minor	0	2	3	1	6
Major	0	4	5	0	9
New System Development	2	8	1	0	11
Other	<u>0</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>6</u>
Total	2	16	11	3	32

N = 32

TABLE 8
**User Involvement in Planning
and Development**

<u>Task</u>	<u>SDE Upper Management</u>	<u>SDE Middle Management</u>	<u>SDE Line Management</u>	<u>LEAs</u>
Initial Planning	32	27	23	14
Systems Specification	12	26	19	7
Development of Hardware	7	8	8	2
Development of Software	5	9	14	3
Training	8	19	18	10
Implementation	10	22	23	12
Evaluation	17	22	16	10

N = 32; n ≠ N

TABLE 9

Amount and Proportion of Time
Spent by MIS Planning Personnel

Tasks	Total Time (man weeks)	Internal Staff	Proportion Performed By		
			Consultants	Contractors	Total
Initial Planning	$\bar{X}=118.75$ $R=3-500$ $N=8$	61.0% $N=11$	35.0%	4.0%	100%
Systems Specifications	$\bar{X}=22$ $R=1-40$ $N=5$	66.0% $N=10$	28.0%	6.0%	100%
Development of Hardware	$T=1$ $N=1$	78.0% $N=5$	18.0%	4.0%	100%
Development of Software	$\bar{X}=29$ $R=16-40$ $N=3$	71.9% $N=8$	16.9%	11.2%	100%
Training	$\bar{X}=5$ $R=2-8$ $N=2$	85.5% $N=8$	11.2%	3.3%	100%
Implementation	$\bar{X}=24.5$ $R=24-25$ $N=2$	83.1% $N=8$	12.5%	4.4%	100%
Evaluation	$T=8$ $N=1$	90.7% $N=7$	2.2%	7.1%	100%

T = Total
N = 13; n $\neq$ N

weeks. Apparently, two SDEs had full resources for their planning component. The activities requiring the next largest amounts of time are: development of software (29), implementation (24.5), and systems specifications (22). While no definite conclusion can be drawn here about amount of time spent in training and evaluation because of the low N, data presented later on in this chapter will corroborate the low figures here.

In respect to proportion of time contributed by the various categories of personnel, internal staff time dominates, with a range of from 61.0% to 90.7%. These percentages increase steadily as we move down the chart from planning to evaluation. Apparently SDEs feel the greatest need for outside help in the areas of initial planning and systems specifications. This need is probably tied to the problem cited as most troublesome in developing an MIS (see Table 5): lack of adequate planning structure within the SDE. Development of hardware and software, however, is largely absorbed by present SDE technical staff, the type of staff dominating information services in the SDE (see Table 3).

Consultants are used to a greater degree than contractors for all tasks.

When asked if they would keep or change the figures in the preceding table, eight SDEs said they would keep them, six would change. (One state which did not reply to the preceding question had some input here.) Among the five states who filled out the table showing how they would change the time distributions in developing their IS, the trend is to keep a high level of internal staff participation (a range from 75-90%) for all tasks, and reduce their percentage use of consultants and contractors to a range of from 10-25%.

SDE staff experienced little difficulty in working with consultants and contractors. Each category in Table 10 indicates the number of states experiencing the problem and the degree of difficulty involved.

"Other" problems indicated by SDEs as troublesome with contractors are transition to in-house staff (VD) and specificity of work (D); for consultants, the consulting firm's self-serving interest (D).

Again, the low response makes it difficult to generalize. Some observations: cooperation and coordination are not very difficult for either group, while meeting deadlines and quality of work cause more problems. Meeting deadlines has been a more difficult problem with contractors.

When asked what steps they would take to overcome the problems with contractors and consultants, seven states responded. Their comments for both contractors and consultants are summed up by the following:

Define mission explicitly.

Select consultants carefully.

Review time schedule during negotiations. Review should include discussion of responsibilities and time requirements for both parties, and schedule conflicts should be corrected before the contract is awarded. Also, the contract should contain a clause to describe the procedure that will be followed in monitoring the work of the contractors. One person should be given the responsibility for monitoring the contract and maintaining all communication to the contractor.

Specify products in detail in written contract, providing financial penalties for delay or failure to deliver. Be sure to specify who is going to spend what percent of time in which phases of the contract and their qualifications.

Develop strong internal technical staff and rely on contractors for specific areas of expertise that are not economically feasible to staff internally.

Have a specific development procedure (see Benjamin, Robert I., *Control of the Information Systems Development Cycle*, Wiley Interscience, New York, 1971); develop an in-house staff capable of administering the contract; acquire necessary staff to accept, test, and maintain the delivered item before the contract is let; participate heavily. (This applies to both contractors and consultants.)

Allow for internal delays in the Department due to such things as summer vacation schedules, out-of-state conferences, etc.

Use consultants as resource persons, not as project leaders. Use consultants sparingly, only to provide specialists who cannot be made available internally.

TABLE 10

SDE Staff Difficulty in Working With
Consultants and Contractors

	Contractors			Consultants		
	Great Difficulty	Moderate Difficulty	Minor Difficulty	Great Difficulty	Moderate Difficulty	Minor Difficulty
Cooperation	1	1	6	0	1	6
Coordination	1	2	4	0	4	4
Meeting Deadlines	3	5	1	3	2	3
Quality of Work	3	2	4	2	2	4
Total	8	10	15	5	9	17

N = 11; n ≠ N

Make certain that any systems consultants leave tried, tested, demonstrable, and working systems. Flow charts are not enough.

D. Training and orientation: What training and/or orientation programs have been or are being conducted, if any?

Seventeen of forty states participating in our survey have, or are conducting training or orientation programs in a formal mode to implement the information systems modification. Content covered and trainees are indicated in Table 11.

As evident from the table, only seventeen of the forty states are running training and/or orientation programs. Most states are orienting all levels of management almost equally; top and middle management are being trained about information use in decision making, with line management receiving significantly less instruction in this area. Training in data collection, data processing, and data analysis is highly concentrated among the data processing staff, a finding not evident in Table 8. Line management and data processing staff are the groups receiving the most training in report production, with top and middle management and other information systems staff forming a secondary group. The low involvement of LEAs in all training phases is evident. None of the states indicated any changes they would make in future training.

Summary

1. Sixty-five percent of the SDEs responding state that they have a specific plan for making the information services responsive to management needs. Many of these have undertaken analysis of user needs in the planning of their information services.
2. The method most widely used in identifying user needs is examination of existing output followed respectively by interview, examination of guidelines and laws, task force, and questionnaire.
3. The users most involved in needs assessment process are middle management, followed by line management, top management, LEAs, state and federal government.

4. The degree of effort in identifying user needs is not high (see Table 6).
5. Thirty-two states are undertaking some kind of revision of their systems; six are implementing minor revision, nine are implementing major revision, eleven are developing new systems, and six are involved in some combination of these three types of revision.
6. The time required for minor revision is "ongoing;" for major revision, ten to sixty months, with an average of twenty-five; for new systems, twelve to one hundred twenty months, with an average of forty-five; and for combinations, thirty-six to fifty months, with an average of forty-one.
7. Of the various tasks involved in developing IS, initial planning has more involvement by upper management, systems specifications by middle management, training and implementation by middle and line management, and evaluation by middle management. Management is little involved in development of hardware and software.
8. The majority of all tasks in the planning are performed by internal staff. Consultants are used much more than contractors, primarily for initial planning and systems specifications. SDEs prefer limited use of outside expertise.
9. In working with consultants and contractors, SDEs report no serious problems in cooperation and coordination. Meeting deadlines and quality of work cause more difficulty.
10. They do, however, indicate the need to specify time constraints and products very carefully in the contracts.
11. Only seventeen of the forty states responding have or are conducting training or orientation programs.
12. Most states are providing similar amounts of training to all levels of management, with type of training differentiated according to the particular needs of the users. Data processing staff receives more training than any other group. LEAs are involved very little in training.

TABLE 11

Percentage of SDE Staff
Training for MIS

<u>Trainee</u>	<u>Orien- tation</u>	<u>Informa- tion Use Decision Making</u>	<u>Data Collection</u>	<u>Data Processing</u>	<u>Data Analysis</u>	<u>Report Production</u>
Top Management	70.6%	70.6%	29.4%	11.8%	23.5%	35.3%
Middle Management	76.5%	76.5%	41.2%	11.8%	35.3%	29.4%
Line Management	76.5%	58.8%	47.1%	29.4%	28.4%	41.2%
Data Processing Staff	58.8%	35.3%	58.8%	70.6%	58.8%	47.1%
Other Information Systems Staff	23.5%	23.5%	29.4%	35.3%	29.4%	29.4%
LEA	11.8%	11.8%	17.7%	5.9%	00.0%	11.8%

N = 17; T = 100

IV. DATA COLLECTION

One of the most basic steps in the operation of any information system is the gathering of data. Decisions based on information coming out of the system are usually no better than the data upon which they are based. The assumptions that go into the selection and coding of data input are most influential in determining the effectiveness of the MIS. Therefore, those responsible for data collection have great responsibility for the effectiveness of the system as a whole. The technical operations involved are, of course, complex, especially because of today's sophisticated machinery and the overwhelming real world events from which input must be derived.

Remembering Figure 1 (MIS Operation) in Section I of this paper, we can see the operations that constitute the information system. Real world events serve as the raw material to be fed into the system. These must be carefully defined and sources which assure comprehensiveness and/or representativeness selected, and they must be translated into a form (data base) by which they can be utilized by the data management system. With respect to education program planning, monitoring, evaluation, and decision making, the process by which real world events are categorized and collected depend upon a close working relationship between those who provide data, those who process data, and those who use data.

This section concerns itself with the operations and problems involved in obtaining and preparing source data for input into the information system.

Five areas are of concern in this section:

A. Discrimination of input (forms control)

1. Is there a unit which controls forms?
2. What is the name of the unit?
3. How many FTE staff are involved in this task?
4. Has a forms analysis been conducted in your SDE in the past three years?
5. Who conducted it?

B. Duplication: Is there an active mechanism for eliminating unnecessary duplication in the collection of data elements for your information system? Indicate the mechanism.

C. Burden on the sources:

1. Is there a method for minimizing burden on the sources, both internal and external?
2. Do you avoid certain time periods in collecting data from the sources? What are those?

D. Editing:

1. How many FTE staff are involved in data editing for automatic data processing?
2. For manual data processing?

E. Quality control: What techniques do you use to control quality of source data fed into your system?

First, consider forms control.

A. Discrimination of input:

1. Is there a unit which controls forms?
2. What is the name of the unit?
3. How many FTE staff are involved in this task?

Of the forty SDEs who responded to this question, sixteen exercise *all* forms control in their information services unit. In the remaining twenty-four, control of forms in fifteen is in another unit, and the remaining nine have no formal forms control.

Among the fifteen SDEs who have forms control in other than their information services unit, there is no typical assignment of this responsibility, although many have vested it in service units such as the Division of Vocational Rehabilitation, the Instructional Division, the Division of Administrative Services, and the Office of Research. A few units are entitled Forms Control or Data Control.

Seventeen of the forty responding SDEs indicated the number of FTE personnel involved in forms control; the mean number of such personnel is 1.3.

These data indicate a trend toward forms control within each SDE, but apparently it is a trend without

high priority if we consider the low number of FTE staff assigned to the task.

4. Has a forms analysis been conducted in your SDE in the past three years?
5. Who conducted it?

Of the thirty-eight SDEs who responded to this question, twenty-seven had conducted a forms analysis; fifteen of these were conducted solely by internal staff, five by contractors, one by a consultant, and six by a combination of internal staff and either a contractor or a consultant. The contractors included two separate universities, one large information project, and one commercial source.

B. Duplication: Is there an active mechanism for eliminating unnecessary duplication in the collection of data elements for your information system? Indicate the mechanism.

Of the thirty-five SDEs who responded to this question, twenty-nine have such a mechanism. The major methods are through forms control and centralized data processing. The extent of effort ranges from control of surveys coming into the department to the comprehensive control of all data collection. The controllers range from individuals to committees, to individual divisions, to forms control divisions. Some of these stated clear and definite objectives; others simply stated the general goal of eliminating duplication.

Some explanations of the mechanisms used by the SDEs follow. The variation in the degree and locus of control indicates no clear trend. Perhaps this is tied to the lack of clear-cut practices regarding centralization, which was discussed in Section II of this paper. Mechanisms reported included:

1. All data collection activities are handled or cleared through a single unit.
2. Duplicate data items are to be eliminated in the consolidated reporting system. Any new items must be approved by the data board; an appeal must go to two deputies and three assistant superintendents.
3. All data requests of a continuing nature must be cleared through the Associate Superintendent for Administrative Services.

4. There are two avenues used:

- a. data control examines all requests for data processing activities;
- b. records management forms control has responsibility for designing all data gathering documents. Therefore, this is a means for eliminating duplication.

5. All data collection forms to be supplied by school districts at the request of the department of public instruction are coordinated by the Planning, Research, and Evaluation Division. These forms are reviewed by the division for the purpose of eliminating unnecessary duplication.
6. All new instruments for external data collection must have approval of coordinator of statistical services who checks for possible duplication.
7. Have formed Data Control and Review Committee to screen new data collection instruments and advise state superintendent and MIS regarding necessity of collecting information.
8. All data requests are channeled through one office and in addition LEAs have been asked to refuse to answer duplicate requests and notify this division (Division of Management Information).

C. Burden on the sources:

1. Is there a method for minimizing burden on the sources, both internal and external?
2. Do you avoid certain time periods in collecting data from the sources? What are those?

Of the thirty-eight SDEs responding to this question, twenty-four had some procedure to minimize burden on the sources: eighteen had a procedure for internal sources; sixteen had a procedure for external sources; only ten reported having both. The chief internal procedures are (1) channeling or coordinating data through one unit and (2) limiting SDE requests for data in quantity and scope. The chief external procedures are more varied. They include (1) channeling or coordinating data through one unit, (2) active

participation in Chief State School Officer groups and following practices recommended there, (3) one-time data collection, and (4) "attempts" to control the problem.

Some states with both internal and external procedures indicate the following controls:

Internal

Centralized unit can supply data concerning SDE that has been machine processed.

Limit SDE requests for data from LEA.

Proper design, time of collection, etc.

Examine ways to combine data collection instruments.

Forms must be registered with forms control.

External

SDE request that data come through SDE and we supply data that has already been collected.

SDE completes all requests for data possible from outside agencies such as USOE, public, etc.

Work with USOE, channel all federal reports through SDE.

SDE indicated this procedure for both internal and external sources:

All data requests are channeled through one office and, in addition, LEAs have been asked to refuse to answer duplicate requests and notify this division.

As indicated, one of the more usual forms of control is to channel all requests through one unit in the SDE. This is ordinarily the MIS unit or the unit with major information service responsibilities. In one state, the planning unit performed this function.

Of the thirty-eight SDEs answering this question, half avoid certain time periods in collecting data from

the field; half do not. Eleven avoid September collections, eight avoid May-June; seven avoid both periods; nine avoid more than one other period.

Some responses are:

We try to plan collection so that existing annual reports are taken into consideration before assigning a time for a new report or survey to be made.

Collection is avoided at the beginning and end of the academic year.

Collection is avoided in the summer months.

Year-end reports are staggered.

To the degree possible, the burden is spread throughout the year. However, late spring is generally avoided.

D. Editing:

1. How many FTE staff are involved in data editing for automatic data processing?
2. For manual data processing?

The responses to this question varied considerably. Results are shown in Table 12.

The average MIS unit handles only about 15-25% of the editing of data to be fed into the data management system. This is a significant amount, but lower than might be expected. It should be noted that the extreme of the range for ADP in the MIS unit is clearly biasing the mean as are the high extremes of the range for "other units" for both the automatic data processing and the manual data processing. These extremes indicate a widely varying picture from state to state.

E. Quality Control: What techniques do you use to control quality of source data fed into your system?

Of the forty SDEs who responded to this question, 80% rely on identification of high error sources during editing; 75% rely on spot checks for completeness and for accuracy; 65% rely on feedback of general

TABLE 12

FTE Staff in Data Editing

<u>For MIS Unit</u>		<u>For Other Units</u>	
Automatic Data Processing	$\bar{X}=2.4$ R=0.1-18.5 N=28	Automatic Data Processing	$\bar{X}=7.4$ R=1-55 N=15
Manual Data Processing	$\bar{X}=1.2$ R=0.5-4.6 N=17	Manual Data Processing	$\bar{X}=7.3$ R=0.5-65 N=12

information to and on orientation of source personnel; 47.5% had "other" means of control, including many who had full checks of all data, by hand and/or by computer.

"Other" responses include:

Comparison of same data gathered by different means.

Pilot tests are conducted with external sources for all forms and instructions.

In rural ---, we have much personal knowledge of local operations, and therefore, during editing we usually "spot" most errors.

Computerized edit checks within error tolerance ranges are used on some documents.

Comprehensive checks are conducted for completeness of data.

On every report there is a complete hand and computer check of all items for completeness and accuracy.

This is a very difficult task to execute. Currently very few validity or reliability tests are performed.

Summary

1. There is a trend toward forms control within each SDE. Of the forty SDEs responding, sixteen have *all* forms control in their IS unit; fifteen have forms control in another unit; only nine have no forms control. For those states using other than the IS unit, the control

is in a service unit or a data control unit. The average number of FTE staff involved, in the seventeen states who provided data, is only 1.3.

2. Twenty-seven of thirty-eight states reported having conducted a forms analysis within the past three years: fifteen of these were solely by internal staff; five were by a contractor; one was by a consultant; combinations were involved in the others.
3. Twenty-nine of forty SDEs have an active mechanism for eliminating unnecessary duplication in the collection of data elements for their IS. The major methods are forms control, centralized data processing, and channeling all requests through a single unit.
4. A large number of states reporting (twenty-four of thirty-eight) have some procedure for minimizing burden on the sources. This consists largely in avoiding collection of data during certain times of the year.
5. The number of FTE staff involved in editing is much lower in the MIS unit (as defined in Section II) than for "other" units involved in data processing.
6. Quality control of source data has high priority in SDEs. Of the forty SDEs who responded to this question, 80% rely on identification of high error sources during editing; 75% rely on spot checks for completeness and for accuracy; 65% rely on feedback of general information and on orientation of source personnel; 47.5% had "other" means of quality control in addition to these.

V. DATA PROCESSING

The major areas of concern in this section are:

A. Number of units:

1. What units perform data processing?
2. What percent of the total data processing does each handle?

B. Budget: What percent of the budget for each unit is devoted to the various SDE functions which require processing?

C. Automatic vs. manual data processing:

1. What percent of each SDE function is

- processed automatically?
2. What percent manually?

D. Contractors:

1. Are any data management activities handled under contract?
2. Which ones?

E. Software:

1. Did you purchase or adapt an existing software system?
2. What is its name?
3. What is the cost of purchasing or renting?
4. What was the cost of adapting?
5. What degree of success have you had?
6. What problems have you met in the adaptation?

F. Regional centers: Are there any plans for the establishment of regional centers?

A. Number of units:

1. What units perform data processing?
2. What percent of the total data processing does each handle?

As shown by the data in Section II, data processing has a high degree of centralization in SDEs throughout the country. Of thirty-three states indicating the number of units involved in data processing in their SDE, eighteen have only one unit, seven have two units, four have three units, and four have four units.

The breakdown for two, three, and four unit states in percent of load handled are as shown in Table 13.

For two and three unit states, unit one is clearly the major unit in most cases, with the second and third units functioning in an auxiliary capacity. In one state, the proportion of work was split about evenly between the first two units.

In the states with four units involved, the pattern is not as clear. However, the largest unit in each state handles 40-75% of the workload; the next largest unit handles 10-41%; the next, 5-30%, the smallest, 5-6% of the workload.

In summary, the pattern is clearly for one unit to handle the majority of data processing work, even when this responsibility is not centralized.

B. Budget: What percent of the budget for each unit is devoted to the various SDE functions which require data processing?

The percent of budget used by each unit to support the various functions which are processed is indicated by Table 14. Since not all categories applied to all states, percents do not add to 100.

The table shows the following ranking of allocation of the average budget under the "Total" column. Totals were figured as a weighted average of proportions given for each unit.

1. Other	21.7%
2. Accounting/Budgeting	20.3%
3. Personnel Statewide	15.9%
4. Pupil Files	15.3%
5. Federal Reporting	14.5%
6. Test Processing and Reporting	9.7%
7. Program Management and Monitoring	8.5%
8. Facilities/Property/Inventory	4.4%
9. Personnel Within the SDE	2.7%

For states with more than one unit, significant percentages of the budget are used by the additional units for accounting/budgeting, as well as for personnel statewide and program management and monitoring. These "other" units seem to concentrate their efforts on specific functions, whereas the major unit (Unit 1) distributes its efforts more across a variety of functions.

Significant in these percentages is the fact that about 20% of DP budget is used for accounting/budgeting, 15% for personnel statewide, 4% for facilities/property/inventory, and 3% for personnel

TABLE 13

Distribution of Data Processing
Where More Than One Unit is Involved

Number of Units Involved in Data Processing	Number of States	Proportion of Work by Each Unit							
		Unit 1		Unit 2		Unit 3		Unit 4	
		Mean %	Range	Mean %	Range	Mean %	Range	Mean %	Range
2	7	86.4	75-95	13.6	5-25				
3	4	61.3	45-80	25.0	15-40	13.7	5-25		
4	4	54.8	40-75	26.5	10-41	13.5	5-30	5.2	5-6

TABLE 14

Percent of Budget Allocated for
Data Processing Units

<u>Function*</u>	<u>Unit 1</u>	<u>Unit 2</u>	<u>Unit 3</u>	<u>All Others</u>	<u>Total</u>
Accounting/ Budgeting	$\bar{X}=27.0\%$ R=1-80 N=26	$\bar{X}=9.1\%$ R=0.5-25 N=8	$\bar{X}=6.6\%$ R=3-18.75 N=5	$\bar{X}=5.4\%$ --- N=1	$\bar{X}=20.3\%$
Facilities/ Property Inventory	$\bar{X}=5.9\%$ R=1-20 N=9	$\bar{X}=2.9\%$ R=0.3-7.5 N=3	$\bar{X}=0.2\%$ --- N=1	$\bar{X}=0.2\%$ --- N=1	$\bar{X}=4.4\%$
Personnel within the SDE	$\bar{X}=3.0\%$ R=2-20 N=9	$\bar{X}=0.6\%$ 0.3-0.8 N=2	$\bar{X}=0.2\%$ --- N=2	$\bar{X}=9.2\%$ --- N=1	$\bar{X}=2.7\%$
Personnel Statewide	$\bar{X}=19.3\%$ R=1-40 N=19	$\bar{X}=7.4\%$ R=0.6-12.5 N=5	$\bar{X}=9.9\%$ R=0.2-18.75 N=2	$\bar{X}=4.8\%$ --- N=1	$\bar{X}=15.9\%$
Pupil Files	$\bar{X}=12.5\%$ R=1-20 N=10	$\bar{X}=25.0\%$ R=7.5-52.5 N=3	--- --- ---	--- --- ---	$\bar{X}=15.3\%$
Program Management and Monitoring	$\bar{X}=10.8\%$ R=1-32 N=9	$\bar{X}=6.7\%$ R=0.9-16.4 N=4	$\bar{X}=6.3\%$ R=0.2-24 N=6	--- --- ---	$\bar{X}=8.5\%$
Test Processing and Reporting	$\bar{X}=9.7\%$ R=2-36 N=11	--- --- ---	--- --- ---	--- --- ---	$\bar{X}=9.7\%$
Federal Reporting	$\bar{X}=14.5\%$ R=1.5-59 N=21	--- --- ---	--- --- ---	--- --- ---	$\bar{X}=14.5\%$
Other†	$\bar{X}=23.1\%$ R=1.5-50 N=18	$\bar{X}=0.6\%$ --- N=1	$\bar{X}=37.5\%$ --- N=1	$\bar{X}=2.5\%$ --- N=1	$\bar{X}=21.7\%$

*One state had its own breakdown

†States did not indicate what functions are included in "other"
N = 26, T ≠ 100

within the SDE. This means that more than 43% of the DP budget goes for "housekeeping." Another 15% is used for federal reporting. Only some 9% is available for program management and monitoring.

C. Automatic vs. manual data processing:

1. What percent of each SDE function is processed automatically?
2. What percent manually?

The proportions of each function handled by automatic and manual data processing are indicated by Table 15.

As the table indicates, the processing of information for the functions of personnel statewide, test processing and reporting, accounting/budgeting and "other" are chiefly automatic. This includes three of the four largest budget percentages from Table 13. The processing of information about personnel within the SDE, federal reporting, program management and monitoring, facilities/property/inventory, and pupil files are chiefly manual. Those functions are most heavily automated which also have the greatest budget expenditures.

3. Indicate your plan for the future in regard to automatic and manual data processing for each function listed in the previous question.

Table 16 shows that SDEs are decisively in favor of greater automation primarily for the areas of program management and monitoring, facilities/property/inventory, federal reporting, accounting/budgeting, and pupil files. Note that no state is planning for less automation in any area.

Accounting/budgeting already has a high budget and a high degree of automation, and this is the area where the largest number of states are now implementing change. The other three categories indicated as having priority for automation (facilities/property/inventory, program management and monitoring, and federal reporting) are among those which presently are least automated.

More automatic data processing seems clearly to be of high priority; however, only about half of those wanting change are actually planning change and roughly half of the latter (25% of the total) are implementing change.

D. Contractors:

1. Are any data management activities handled under contract?

Out of the forty SDEs responding, only nine contract any data management activities. Only two states contract more than one activity. The activities and the percent handled under contract are shown in Table 17.

The table shows that certain very specific SDE functions (statewide assessment, vocational education) and certain other very specialized activities (ERIC/DIALOG) are contracted.

E. Software:

1. Did you purchase or adapt an existing software system?
2. What is its name?
3. What is the cost of purchasing or renting?
4. What was the cost of adapting?
5. What degree of success have you had?
6. What problems have you met in the adaptation?

Of thirty-nine states responding, only seven answered yes; four purchased an existing software system and three rent their system. The data regarding these adaptations is shown in Table 18.

Significantly, only a small proportion of the states (18%) responding tried an adaptation. Among those who tried, only moderate success was experienced. The variety of problems met in adapting these systems is illustrated by the following responses:

Lack of skilled personnel.

Design limitations; record size, query flexibility; lack of editing functions; constraints in data; manipulation; inefficient search algorithms.

The system was new and not fully debugged when we started benchmark tests; the system efficiencies have been less than desirable.

Interfacing with hardware and software changes.

Training is limited.

TABLE 15

Average Percentages of Automatic
and Manual Data Processing

<u>Function</u>	<u>Automatic</u>	<u>Manual</u>	<u>Total</u>
Accounting/Budgeting	55.0%	45.0%	100% N=24
Facilities/Property Inventory	30.0%	70.0%	100% N=21
Personnel Within SDE	20.0%	80.0%	100% N=22
Pupil Files	36.6%	54.4%	100% N=14
Program Management and Monitoring	27.0%	73.0%	100% N=22
Test Processing and Reporting	58.0%	42.0%	100% N=17
Federal Reporting	28.5%	71.5%	100% N=22
Other	40.0%	60.0%	100% N=8

TABLE 16
Plans for Change in Automatic
Data Processing

<u>Function</u>	<u>Leave the Same</u>	<u>Greater Automation</u>	<u>Less Automation</u>	<u>Planning Change</u>	<u>Implementing Change</u>
Accounting/Budgeting	11	23	0	12	10
Facilities/Property/ Inventory	4	27	0	11	2
Personnel SDE	12	15	0	10	2
Personnel Statewide	14	19	0	10	5
Pupil Files	5	23	0	11	5
Program Management and Monitoring	4	27	0	9	7
Federal Reporting	7	26	0	13	6
Other	4	4	0	2	0

N = 34

TABLE 17

Data Management Activities Handled Under Contract
Activity in Nine States

	<u>Activity</u>	<u>Percent Contracted</u>
1.	High priority systems/program development beyond workload limitations	2.0%
2.	Statewide assessment	100.0%
3.	Vocational Education; Student-Teacher Data System	60.0%
	High School Follow-up Data System	60.0%
4.	Fall survey	80.0%
5.	ERIC/DIALOG	100.0%
6.	Vocational Education; MIS	100.0%
7.	CPU time	33.3%
8.	Fall keypunching	.5%
9.	Budgeting/Accounting/Reporting	50.0%

TABLE 18

Software Adaptations

<u>Rent or Purchase</u>	<u>Supplier</u>	<u>Name of Software Systems</u>	<u>Cost of Purchasing or Renting</u>	<u>Cost of Adapting</u>	<u>Degree of Success</u>
Rent	no response	no response	\$170,000/ year	\$225,000	Moderate
Rent	CDC	MARS	"Included in rental"	\$100,000	Moderate
Rent	MRI System Corp.	System 2000	\$840/year royalty charges	\$18,000 ('72)	Moderate
Purchase	IBM	PRESS	"Included in another contract"	Unknown	Very High
Purchase	Touche- Ross & Co.	STRATA	\$5,000 for training paid by users	STRATA is implemented at central computer facilities	Moderate
Purchase	AGT Corp.	GSS	no response	no response	no response

7. Are special software packages, special coding procedures, or other components of your DP system adaptable and could you recommend them to another SDE?

Twelve of the thirty-three who responded to this question said yes. Among their comments were:

An on-line terminal subsystem for client statistical and fiscal data for voc-rehab clients.

Personnel file coding system; PPBS accounting package now being tested.

Press will send documentation and tape to be copied and returned. Cannot allocate man hours to assist in installation. Will give orientation to visitors. Other systems in which an SDE might be interested should be investigated by a visitation team after which arrangements could be made for transfer or adaptation.

Software might be available to other LEAs if requested.

Division of voc-rehab client information system.

MARS; respond.

Subject codes; county, district, site codes; teacher certification areas.

LEA administrative applications

Program oriented information system; voc-rehab accounting system; high school follow-up.

Eight states indicated their availability to help other states adapt one or more of these components.

One state has designed its own software over a five-year period with high success. Their major problem is constantly changing report requirements of federal and state governments.

F. Regional centers: Are there any plans for the establishment of regional centers that will complement the department's data processing capability?

Of the twenty-five states who responded to this question, all are involved in some way in planning or working toward a regional center. Five of these are considering or discussing regional centers. Some of their comments are:

This is an area under some consideration in the event of planning alternate methods of financing public schools—full funding by the state, etc.

Only at the talking stages now.

Discussing plans to allow regional pilot centers to report data directly through SDE computer.

Four are conducting a preliminary survey or have appointed a committee to develop regional centers. Typical responses are:

A state data processing committee has been established by the superintendent of public instruction. A survey was conducted and a committee report was presented requesting resources for further activity in the development of a statewide educational data processing plan.

A survey was completed in 1969 and is being updated at the present time regarding regional centers.

Study recommended a regional center and was adopted by the state board.

Two have enabling legislation:

We have a new law that gives the state board the power to approve, supervise and control all educational data processing services. A plan is now being formulated.

We have recent legislation permitting the establishment of RESAs; however, it will be several years before anything of this nature will become a reality.

Six are planning or have planned centers. Comments include:

Plans are under development.

Some plans have been in the works for five years, but no funds.

Our state is currently moving toward a statewide instruction network for elementary, secondary, vocational, and higher education. This will then lead to regional management information service centers.

Five are developing centers:

The department is providing computer time not required for SDE processing. Four regional centers are being established to provide administrative and instructional computing to school districts.

State leadership in developing two centers; plus completed statewide study leading to multiple regional centers.

A statewide network is under development which will supply SDE data requirements.

Three have centers:

Now have four regional centers but with no DP capability; will be working on detailed plans for introduction to the next session of the legislature.

Four regional centers are planned: one is active; one in initial development stage.

The trend is clearly toward at least a desire for the development of regional centers, and a good deal of work has gone into planning and preparation for developmental activities. Only a third of the states reporting on this activity are actually doing more than plan at this time, however.

Summary

The data presented in this section may be summarized as follows:

1. Data processing has a high degree of centralization among the SDEs. Of thirty-three states indicating the number of units involved in data processing in their SDE,

eighteen have only one unit, seven have two units, four have three units, and four have four units. In the multi-unit states, one of the units handles the majority of the data processing.

2. Of the nine categories of processed data, the greatest percent of the data processing budget is spent for the functions of accounting/budgeting (20%), personnel statewide (16%), and federal reporting (15%) with "other" getting 22%.
3. On the average, more of the data processing for different functions is handled manually than automatically.

The functions most heavily automated are personnel statewide (64%), other (60%), test processing and reporting (58%), and accounting/budgeting (55%). The least automated are personnel within the SDE (20%), program management and monitoring (27%), federal reporting (29%), and facilities/property inventory (30%).

4. A large percentage of states want to increase automation, primarily for those functions currently having low automation. (The only exception is desire to increase automation for accounting/budgeting.) However, only about half are planning change, and only half of those are implementing change.
5. Only nine states report data management activities handled under contract. These consist of very specific SDE functions (e.g., Vocational Education) or other specialized activities (ERIC/DIALOG).
6. Only seven states have purchased, rented or adapted an existing software system. Of those who have, the choice seems based on local availability of purchase. Costs of purchasing or renting and costs of adapting vary widely. The degree of success is moderate.
7. Twenty-five of forty states are discussing, are investigating, have enabling legislation, are planning or have planned, are developing, or are operating regional centers.

VI. INFORMATION DELIVERY

Seven areas are of concern in this section:

- A. Types of information delivery and degree of success in supplying needed information:
 - 1. In what ways is information delivered to the various users in your system?
 - 2. What degree of success is attained in supplying needed information to your user?
- B. Quality of output: How difficult is it to attain a satisfactory level in information system output?
- C. Evaluation:
 - 1. Has there been a formal evaluation of the information system and its output within the past twelve months?
 - 2. Who conducted it?
 - 3. How useful was it in revising the system?
 - 4. How often is formal evaluation recommended?
- D. Unscheduled requests:
 - 1. How often are unscheduled requests received from users?
 - 2. Which of these is the system (a) most successful (b) least successful in meeting?
 - 3. How long does it take to meet the requests?
- E. Scheduled reports: What kinds of reports are regularly produced?
- F. Federal reporting: Estimate the percentage of federal reporting handled by the information system and by other means.
- G. Methods of improving success: Discuss briefly any ideas about ways to increase success in providing information to various users.

A. Types of information delivery and degree of success in supplying needed information:

- 1. In what ways is information delivered to the various users in your system?

Responses are tabulated in Table 19. Since categories are not mutually exclusive, percents do not add to 100 in any direction.

Written reports are clearly the major type of delivery mechanism. (One state reports that almost all of its delivery is by written report.) The next most common type of delivery—personal contact with an information specialist—is used in 30-46% fewer instances than reports. Use of information centers and other personal contact are roughly equivalent. Other means are almost non-existent. State Superintendents, Deputies, and other top management have almost equal exposure to all the methods, with the exception that the State Superintendent has less personal contact with the information specialist. Line management gets less delivery by reports than other management and more contact with the information center. LEA contact is similar to that of line management though they get less delivery through the information center and other personal contact. Legislative users mainly receive reports and have contact with the information specialist. Other state government and federal users have proportionately less types of delivery than other groups.

- 2. What degree of success do you feel you attain in supplying needed information to your user?

On the basis of Table 20, SDEs feel only moderately successful about supplying needed information to State and Deputy Superintendents, other top management, and LEAs. They feel more successful with the federal government and with middle management. The degree of success with line management, legislative users, and other state governments is not so clear because the percentages are close; apparently, there is wide divergence in feelings about these groups.

TABLE 19

Percentage Use of Types of
Information Delivery for Different Users

<u>User</u>	<u>Written Reports</u>	<u>Information Center*</u>	<u>Personal Contact With Informa- tion Specialist</u>	<u>Other Personal Contact</u>	<u>Other</u>
State Superintendent	95%	30%	51%	33%	5%
Deputy Superintendent	92%	33%	59%	30%	5%
Other Top Management	90%	33%	62%	35%	8%
Middle Management	92%	33%	54%	36%	5%
Line Management	85%	38%	56%	36%	5%
LEAs	85%	30%	44%	28%	5%
Legislative Users	85%	30%	41%	36%	3%
Other State Government	72%	26%	33%	15%	0%
Federal Users	62%	18%	21%	10%	0%

*One state has a center under development
N = 30, T ≠ 100

TABLE 20

Percentage of Success in Supplying
Information to Users

<u>User</u>	<u>N</u>	<u>Very High</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Very Low</u>
State Superintendent	36	19%	25%	44%	8%	3%
Deputy Superintendent	35	7%	28%	44%	5%	3%
Other Top Management	36	11%	25%	42%	5%	3%
Middle Management	35	11%	42%	33%	3%	3%
Line Management	35	14%	37%	31%	3%	3%
LEAs	36	14%	19%	47%	14%	5%
Legislative Users	36	11%	31%	39%	14%	5%
Other State Government	34	11%	31%	25%	11%	5%
Federal Users	31	19%	42%	28%	3%	0%

 N = 36

B. Quality of output: In your experience, how difficult is it to attain each of these characteristics to a satisfactory level?

Since no category is mutually exclusive, the columns in Table 21 do not add up to forty either way.

Comprehensiveness and timeliness are clearly the most difficult to attain, with content and accuracy less of a problem but still in the fairly difficult to very difficult range. The least difficult characteristics to achieve are clarity and format.

C. Evaluation:

1. Has there been a formal evaluation of your information system and its output within the past twelve months?
2. Who conducted it?
3. How useful was it in revising the system?
4. How often do you recommend formal evaluation?

Twelve of the thirty-eight states reporting had conducted a formal evaluation within the past twelve months. They indicated the information shown in Table 22 as to the usefulness of their evaluation.

Half of the states had internal, half external evaluation; one external and three internal evaluations were highly successful; two other internal and two other external were only moderately successful; one external was not very useful; three do not yet have results. Eight of these states recommended continuous evaluation; four did not. Overall, the amount of evaluation underway seems quite small relative to the importance this function is given in the literature and by information specialists themselves.

D. Unscheduled requests:

1. How often do you receive unscheduled requests from your users?
2. Which of these are you (a) most successful (b) least successful in meeting?

As clearly shown in Table 23, most unscheduled requests are occasional. The total for "occasionally," in fact, is higher than all other categories combined except for two groups of users, Instructional Divisions and Administration/Budgeting.

Not surprisingly, the requests most successfully handled are those for which data are already in the file; content requested is often financial data or state staff data. Average number of days in fulfilling a "most successfully handled request" is 5.6, with a range of days of zero to twenty. Types of requests which are easily filled include:

Those for which the basic data is already in the data base.

Simple data analysis and summary reports using one or two files and not spanning multiple years.

Areas having greatest automation.

Requests that have been preceded by thoughtful consideration of what data are needed, how they will be used, etc. Requests that are discussed in detail with this section's personnel.

Where existing software can handle the request.

Financial—budgeting and reporting personnel (in-state).

The requests least successfully handled are those for which data are not in file. In terms of content, this often means extensive or complex requests; other difficult requests are (1) requests from various departments of government, (2) subjective information, (3) federal reports, (4) questionnaires, (5) requests by those who don't understand what they want, and (6) requests requiring special programming. Average time in filling these requests is thirty-five days, the range is four to three hundred sixty days. Some examples of this type of request are:

Those involving several different departments of government in a composite reply.

Complex mathematical computations with multiple files, prolific categorization, and spanning more than one year of data.

Complex reports requiring data from several sources.

Requests for subjective information.

TABLE 21
Difficulty of Achieving Quality Output

	<u>Almost Impossible</u>	<u>Very Difficult</u>	<u>Fairly Difficult</u>	<u>Not Very Difficult</u>	<u>No Response</u>
Accuracy	0	19	12	9	0
Timeliness	8	16	13	7	0
Clarity	0	8	21	10	1
Format	0	7	25	6	2
Content	4	12	15	9	0
Comprehensiveness	22.5	12	11	5	2
Other	0	1	0	0	39

n = 40

TABLE 22
Evaluation of MIS

	<u>Who Conducted</u>	<u>How Useful</u>	<u>Frequency of Evaluation</u>
1.	Internal - Task Force	Moderate	Continuous
2.	Internal - Task Force	Highly	Continuous
3.	External - OE	Highly	Less than once a year
4.	Internal Staff - Continuous	Highly	Continuous
5.	OE - State Team	Moderate	Continuous
6.	Internal - Continuous between Staff and Users	Highly	Continuous
7.	External - OE Team	Moderate	Continuous
8.	Internal - Ongoing by Data Committee	Moderate	Continuous
9.	External - Contractor	Not Very Useful	Continuous Informal
10.	External - Consultant	Not Completed	
11.	External - Consultant to State	Not Completed	Once a Year
12.	External - Governor's Office	---	---

TABLE 23

Frequency of Unscheduled Requests

<u>User</u>	<u>Daily</u>	<u>Once/ Weekly</u>	<u>Once Every 2 Weeks</u>	<u>Once/ Monthly</u>	<u>Occasionally</u>	<u>Never</u>
State Superintendent	2	5	2	4	19	1
Other Top Management	4	7	2	4	15	0
Instructional Divisions	5	0	5	10	11	1
Administration/ Budgeting	2	5	4	6	12	2
Vocational & Technical Education	0	3	3	1	19	2
Special Education	1	4	1	4	17	3
Legislature	0	7	1	4	18	1
Other State Government	0	2	1	8	18	2
LEAs	4	1	1	4	19	2
Other	1	0	1	1	3	0

N = 34; n ≠ N

Those for which a special request from LEAs must be made.

Those relating to evaluation.

E. Scheduled reports: What kinds of reports do you regularly produce?

Of the forty states, fourteen states gave no response to the question on scheduled reports, sixteen answered it on the questionnaire, ten attached lists.

Of those responding on the questionnaire, few answered completely. Few categorized reports; most reports listed are issued annually; the number of copies ranged from three to 10,000 (Education Directory). Distribution ranged from one person per report to all persons indicated.

Lists attached ranged from six pages to a seventy-nine page computer printout. In a few of the lists, the reports were categorized. One state gave the categories shown in Table 24. This table represents typical categories of reports. Other typical titles included reports on facilities, teachers (certification, lists by school), professional personnel, transportation, school lunches, vocational rehabilitation, and statistical report.

F. Federal reporting: Estimate the percentage of federal reporting handled by the information system and by other means.

Table 25 indicates that the greater portion of federal reporting comes directly from the information system and from other SDE units. The least amount comes directly from LEAs.

This means that SDEs are assuming a service burden for their local constituencies in this function.

G. Ways to increase success in providing information. Discuss briefly any ideas you have on ways to increase success in providing information to various users.

Responses to this question include the following:

The computer is not the information system. All data requests should be justified in terms of time, cost, and usefulness. Most internal user needs will remain stable over long periods of time. Although it is costly not to have data available when needed, it is also costly to maintain unused data. Long-range planning can reduce the problems in this area. In machine data processing, standardized coding and classification should be used whenever possible. Output specifications must be planned before selecting inputs.

Success depends on pre-planning and on cooperation between local, intermediate, and SEA. Training and participation are important, as is commitment and patience from everyone. Procedures must be well-defined and used. Forms control with authority is needed.

Assuming that the needs of the users have been thoroughly investigated and incorporated into the design of the information system, it is vitally important that the system be responsive and responsible to the users. Time commitments for providing information must be met, and immediate access to data files should be made available to users through remote terminals.

Establish data processing as a function of the total Information Systems operation.

In our state, like other states, we are short of money and personnel to develop a complete MIS. We also have some concerns about collecting detailed information at the state level. This data is felt to be more necessary at local levels and the state needs only access to the data and usually in summary form. I personally feel that much of the data needed at the state level is already collected but is not in a form to be used by everyone. We then are concentrating on coordinating data collection and putting it into a data base for use by everyone who needs it.

Coordination and consolidation of various independent statistical gatherings and analysis

TABLE 24

Report Categories

<u>Category (With Examples)</u>	<u>Number of Items</u>
Curriculum Guides and Educational Standards (subject, level, content)	18
Directories (of various categories of professional staff)	20
Informational Studies	
Pupils (graduates, enrollments, dropouts)	8
Curriculum (language arts and reading, science, alcohol and drug education)	11
Finance (source of revenue and distribution of expenditures, payments of principal, and interest, costs per pupil)	25
Salaries (teachers, principals, supervisors)	6
Miscellaneous (distribution by type of school, school board membership, transportation)	6
School District Reorganization	10
Newsletters (by subject, Art, Business, English and Reading, Library, Math)	12
Other Publications (Evaluation, Planning, Profile of Professionals, Guidelines, Titles I and III, Teacher Aides)	42

TABLE 25

Percentage of Federal Reporting
Handled by Various Sources

	<u>0-19%</u>	<u>20-39%</u>	<u>40-59%</u>	<u>60-79%</u>	<u>80-100%</u>
From Informa- tion System	2	4	7	5	4
From Other SDE Units	5	6	6	3	3
Directly from LEAs	13	2	0	0	1

N = 26; n ≠ N

so that duplications are eliminated and so that integrated data subsystems are established.

An economical, expedient way to get data in a central file with school districts ultimately charged with the responsibility for accuracy. And a simple user oriented query language so that management people can interface directly with the systems and utilize the computer as a tool.

1. Have a visible product as soon as possible and as often as possible during entire range of phases of development.
2. Whenever possible, develop in-house capability as opposed to consultants or service vendors.

Involve LEAs and all within SEA in the development of a total. Identification of total information needs from the beginning will help increase chances of success.

Read:

Blumenthal, Sherman C., *Management Information Systems: A Framework for Planning and Development*, Prentice-Hall, 1969.

Krauss, Leonard I., *Administering and Controlling the Company Data Processing Function*, Prentice-Hall, 1970.

Touche, Ross, Bailey & Smart, *TRB&S Systems Management Series*, TRB&S, 1969.

Summary

1. Written reports are the major type of delivery. Contact with an information specialist, which is the next most common type of delivery, lags way behind (30-46%) the use of written reports. Other means are almost non-existent. Almost all levels of management have equal exposure to the various types of delivery.
2. Most states felt only *moderately* successful about supplying needed information to state

and deputy superintendents, other top management, LEAs and the federal government while most felt highly successful with middle management. The degree of success with other users varies from state to state.

3. The most difficult aspects in achieving quality output are comprehensiveness and timeliness, followed by content and accuracy. Clarity and format present the fewest problems.
4. Only twelve of thirty-eight states have conducted a formal evaluation in the last year. Half of these had internal, half external evaluation. Four evaluations were highly successful, four were moderately successful, one was not very useful, and three have not yet produced results.

Eight of these states recommended continuous evaluation.

5. Except for Instructional Divisions and for Administration/Budgeting, both of which maintain a fairly steady flow of requests, unscheduled requests from different users occur only occasionally.

The requests most successfully handled are those for which data are already in the file. Range of days is zero to twenty; average is 5.6 days. For requests least successfully handled, the range of days is four to three hundred sixty, and the average is thirty-five days.

6. Scheduled reports, regularly produced, vary in number from two to a list of seventy-nine pages; frequency ranges from three days to annually; number of copies varies from three to ten thousand; persons issued to ranges from one to all recipients listed in questionnaire.
7. Most federal reporting is handled directly from the information system unit and other SDE units. The least amount comes directly from LEAs.

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APPENDIX A
MIS QUESTIONNAIRE

T

State _____

Alabama State Department of Education
Management Information System (MIS) Questionnaire

66

INTRODUCTION

The commitment of resources in ESEA, Title V generated changes in SDE's which are still being accepted and implemented. SDE's are assuming leadership and coordination roles which require changes in organizational structures, resource allocation, communication and information. The State Departments in Alabama, Tennessee, and Oregon are engaged in a joint project to redevelop their information services into user-oriented management information systems (MIS) to meet the demands created by these new roles.

As part of our planning effort we are preparing a state-of-the-art paper about information services in State Departments of Education. The paper is being developed in conjunction with the Center for Cooperative Research with Schools (CRWS) at The Pennsylvania State University. Specifically we would like the answers to questions about the development of your information services which will help us to select among alternatives and eliminate problems in the design of information systems in other SDE's. The paper will be shared nationally.

As the person most knowledgeable about information services in your SDE, you have been given responsibility for filling out this questionnaire, which will provide us with the basic information for our state-of-the-art paper. If it is necessary for you to have other SDE personnel fill out sections of the questionnaire because you do not have all the information requested, please fill in their names and position titles in the space provided on the cover sheet.

Because of the small sample size (50 states), a high return response is essential. For that reason we ask your prompt response and a return of the questionnaire by November 15, 1972 in the self-addressed stamped envelope provided.

Thank you for your consideration

Leroy Brown
Superintendent of Schools
State of Alabama

LB/ ja

Directions

This questionnaire has five parts. If you are unable to fill out all of them with the information available to you please give them to someone who can and put his name in the space provided on this cover sheet.

Name and Position Title of Respondent

- I. Background Information
- II. Planning and Implementation
- III. Data Collection
- IV. Data Processing
- V. Information Delivery

PLEASE ANSWER EVERY QUESTION. If information to answer the question is lacking, write "IL." If the question is not applicable to your SDE, write "N/A."

COMPLETE AND RETURN QUESTIONNAIRE IN THE SELF-ADDRESSED STAMPED ENVELOPE BY November 15, 1972 to: Center for Cooperative Research with Schools
302 Rackley Building
University Park, Pennsylvania 16802

I. BACKGROUND

1. Management information systems are in various stages of development in state education departments across the country, and there are differences of opinion regarding such matters as the degree to which the system should be centralized, the manner in which data processing services should be handled, and the like. Please indicate the answers below which most accurately indicate the status of management information services in your state.

- a. The management information system is completely centralized, with all data collection, data processing, and information delivery responsibilities in one unit.

_____ Yes _____ No

If "yes," skip to question 2.

If "no," please answer items b. and c.

- b. Data processing services are handled by:

_____ a single data processing unit which owns or purchases the services it needs.
_____ a single data processing unit which secures services from a (more centralized) state government data processing system.
_____ two or more separate units in the SDE secure their own data processing services as they need them.
_____ other (specify) _____

- c. To what extent is data collection for the SDE centralized?

_____ a single unit handles all data collection
_____ the majority (but not all) of data collection is handled by a single unit
_____ a single unit has a data collection responsibility but handles less than half of the SDE's data collection activities.
_____ each unit in the SDE is responsible for its own data collection.
_____ other (specify) _____

2. Does any unit within the SDE have the term "management information" either in its title or in the written statement of its major responsibilities?

_____ Yes _____ No

If "yes," what is the unit's title

3. Is there a separate unit or subunit whose primary responsibility is planning for management information needs in the SDE?

_____ Yes _____ No

If "yes," give unit title _____

- a. What is the title of the person who heads the planning unit?

- b. What is the title of the position to whom the head of the planning unit reports? _____

4. a. What is the title of your unit? _____

- b. What is the title of the position to whom you (the questionnaire completer) report?

- c. How many people involved in information services are responsible to you? _____

5. What is the structure of your unit? Please attach a diagram, or draw one in the space below. Indicate your unit's position in the total SDE structure.

6. Is there a formalized statement of goals or objectives for your unit?

_____ Yes _____ No

If "yes," please attach a list of the major goals, or list them below.
If "no," formulate your conception of these goals.

7. What is the number of personnel engaged in the information system (IS) in your SDE. Please estimate the full-time equivalents in each space in the table below.

	Professional Permanent	Professional Temporary	Technical	Clerical & Secretarial
Automatic Data Processing (ADP)				
Manual Data Processing				
SDE Planning for IS				
Evaluation IS				
Other Information System Operations				
Other				

8. Indicate the amount and source of the budget for your unit for fiscal year '72 and '73.

	Amount from			
	State	Federal	Other	Total
FY '72	_____	_____	_____	_____
FY '73	_____	_____	_____	_____

9. Indicate the general level of support given your unit by the following people or groups. Check the appropriate category:

	Level of Support				
	Very High	High	Moderate	Low	Very Low
State Superintendent	_____	_____	_____	_____	_____
Deputy Superintendent	_____	_____	_____	_____	_____
Other Top Management	_____	_____	_____	_____	_____
Middle Management	_____	_____	_____	_____	_____
Line Management	_____	_____	_____	_____	_____
LEA's	_____	_____	_____	_____	_____

10. What attributes do you consider important for the person who holds your position to have? Check all that apply, using the appropriate category to indicate degree of importance.

	Essential	Highly Important	Important
Experience in information services	_____	_____	_____
Knowledge of ADP operations	_____	_____	_____
Knowledge of availability and capabilities of various equipment	_____	_____	_____
Knowledge of SDE needs & problems	_____	_____	_____
Administrative and/or teaching experience in schools	_____	_____	_____
Knowledge of manual IS procedures	_____	_____	_____
Knowledge of information flows in the SDE	_____	_____	_____
Knowledge of data analysis techniques	_____	_____	_____
Administrative training	_____	_____	_____
Other (specify):	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

11. What major problems are you experiencing in attempting to design and develop a system of information services? Check all that apply, rank ordering, with 1 being the most difficult problem.

_____	Lack of understanding and knowledge in the SDE about the complexity of a system of information services
_____	Lack of adequately skilled outside source of manpower
_____	Financial restrictions (limited funds)
_____	Lack of appropriate planning structure in the SDE
_____	Lack of models or guidelines
_____	Low priority in SDE for developing an information services system
_____	Software lacking
_____	Hardware not developed enough
_____	Time required to design a system discourages SDE's from beginning
_____	Other (specify)
_____	_____
_____	_____

II. INFORMATION SYSTEM
PLANNING AND IMPLEMENTATION

12. Within your state department of education, is there a specific plan for making the information system responsive to management needs?

_____ Yes _____ No

13. Is any replanning or redeveloping of your information system currently underway?

_____ Yes _____ No

If "no," skip to question 14.

If "yes,"

- a. Indicate the type of change being made:

_____ Minor revision of current information system
_____ Major revision of current information system
_____ Development of new information system

- b. When did the replanning/redevelopment process begin? _____

- c. How many months do you expect the replanning/redevelopment process to require? _____

14. Were (or are) potential users actively involved in planning for and development of your information system?

_____ Yes _____ No

If "yes," check all methods employed to involve users in the planning/development process.

	Interviews	Task Forces	Meetings	Other (specify)
SDE Upper Management	_____	_____	_____	_____
SDE Middle Management	_____	_____	_____	_____
SDE Line Management	_____	_____	_____	_____
LEA Representatives	_____	_____	_____	_____

15. Check all tasks in which the potential users were (or are) involved.

	SDE Upper Management	SDE Middle Management	SDE Line Management	LEA's
Initial Planning	_____	_____	_____	_____
Systems specifications	_____	_____	_____	_____
Development of hardware	_____	_____	_____	_____
Development of software	_____	_____	_____	_____
Training	_____	_____	_____	_____
Implementation	_____	_____	_____	_____
Evaluation	_____	_____	_____	_____

16. a. Was a formal analysis of user needs conducted in planning for the information system?

_____ Yes _____ No

- b. If "yes," check all methods by which needs were identified.

User	Question- naire	Inter- view	Task Force	Examination of Guide- lines & Laws	Examination of Existing Output	Other (specify)
Federal Government	_____	_____	_____	_____	_____	_____
State Government	_____	_____	_____	_____	_____	_____
SDE Top Management	_____	_____	_____	_____	_____	_____
SDE Middle Management	_____	_____	_____	_____	_____	_____
SDE Line Management	_____	_____	_____	_____	_____	_____
LEA's	_____	_____	_____	_____	_____	_____

17. Outside contractors and consultants are sometimes used in information system planning and development. Please estimate the amount of time each group listed below devoted to the following phases in designing, implementing, and evaluating your system. First estimate the total number of weeks required for the phase; then estimate the percent of the total that each group contributed to the phase.

Phase	Total time (man-weeks)	% Internal Staff	% Consultant(s)	% Contractor(s)
Initial planning	_____	_____	_____	_____
Systems specifications	_____	_____	_____	_____
Development of hardware system	_____	_____	_____	_____
Development of software	_____	_____	_____	_____
Training	_____	_____	_____	_____
Implementation	_____	_____	_____	_____
Evaluation	_____	_____	_____	_____

18. a. In view of your own experience to date, how would you advise another state department? Would you leave the time percentages as they are indicated in question 17, or would you change some of them?

_____ Would leave the same
 _____ Would change some of them

- b. If you would change some of them, please indicate the amount of time and/or the percentages for each task which you now consider more desirable.

	Total Time (man-weeks)	% Internal Staff	% Consultant(s)	% Contractor(s)
Initial planning				
Systems specifications				
Development of hardware system				
Development of software				
Training				
Implementation				
Evaluation				

19. Indicate the degree of difficulty you have had with contractors or consultants in the areas listed in the chart below. Rate each area as very difficult, difficult, or minor.

	Contractor(s)	Consultant(s)
Cooperation	_____	_____
Coordination	_____	_____
Meeting Deadlines	_____	_____
Quality of Work	_____	_____
Other (specify):	_____	_____
_____	_____	_____
_____	_____	_____

20. What steps, if any, would you advise a person in another state department to take to overcome some of the difficulties listed in item 19?

Contractors: _____

Consultants: _____

21. Are there now, or have there been, formal training and/or orientation programs conducted to implement the information system?

_____ Yes _____ No

If "no," skip to question 27.

If "yes," answer questions 22 through 26.

22. If "yes," indicate the hours of training and the position title of the trainer.

	Hours of Training	Trainer Title
Top Management	_____	_____
Middle Management	_____	_____
Line Management	_____	_____
Data Processing Staff	_____	_____
IEA's	_____	_____
Other Info. System Staff	_____	_____
Other (specify)	_____	_____
_____	_____	_____
_____	_____	_____

23. Please indicate training content covered for each group by checking all spaces that apply.

	Info. Use In						
	Orientat- tion	Decision Making	Data Coll.	Data Proc- essing	Data Analysis	Report Pro- duction	Other
Top Manage- ment							
Middle Manage- ment							
Line Manage- ment							
Data Process- ing Staff							
Other Infor- mation System Staff							
Other (specify)							

24. Based on your experience to date, how would you advise a person in your position in another SDE regarding training and orientation?

_____ Use a program similar to that indicated in questions 21 through 23.

_____ Change the program as described below.

25. Do you currently have a contractor for any part(s) of your unit operation?

_____ Yes _____ No

If "yes,"

a. Which part(s) of the operation does (do) the contractor(s) handle?

b. What proportion of your unit budget goes to contractor(s)?

c. How would you advise a person in your position in another SDE regarding the use of contractors?

- _____ Use more than we have
_____ Use about the same as we have
_____ Use less than we have

III. DATA COLLECTION

- 26 a. Do you have any active mechanism for eliminating unnecessary duplication in the collection of data elements for your information system?

_____ Yes _____ No

- b. If "yes," please explain briefly how unnecessary duplication is controlled.

27. Does your information services unit exercise control of all forms originating in your SDE?

_____ Yes _____ No

If "no,"

- a. Do any other units exercise forms control?

_____ Yes _____ No

If "yes,"

- b. Name the unit(s) and the position title to whom the head of each unit reports

Unit Name	Position Title

28. If forms control is exercised in the SDE, approximately how many full-time staff equivalents are devoted to this task? _____

29. a. Has a forms analysis been conducted within the past three years in your SDE?

_____ Yes _____ No

- b. If "yes," who conducted the forms analysis?

_____ Internal staff
 _____ Consultant (specify _____)
 _____ Contractor (specify _____)

30. a. The problem of overburdening sources in data collection procedures is a difficult one to avoid, and few information systems have found a way to handle it adequately. Do you have any procedure to minimize the burden on sources, both internal and external?

_____ Yes _____ No

If "yes," please describe the procedure.

Internal: _____

External: _____

- b. Do you avoid certain time periods in collecting data from the field?

_____ Yes _____ No

If "yes," list the periods.

31. Indicate the techniques used to control quality of source data fed into your system.

- _____ Spot checks for completeness of data.
_____ Spot checks for accuracy of data.
_____ Identification of high error sources during editing procedures.
_____ Formal presentations to source personnel.
_____ Feedback of general information and of orientation materials to source personnel.
_____ No quality control exercised.
_____ Other (specify) _____

32. Approximately how many full-time staff equivalents are involved in data editing in your SDE?

	For Automatic Data Processing	For Manual Data Processing
Your Unit	_____	_____
Other Units	_____	_____

IV. DATA PROCESSING

33. What organizational unit(s) perform data processing services within the SDE? Please list the unit(s) by name and estimate the percent of the total SDE data processing load handled by each.

Unit	Percent
1.	
2.	
3.	
4. All Others	

34. Please estimate the percent of the data processing budget(s) used to support the functions below. (Note that the percentages for each unit should add to 100.)

	Unit 1	Unit 2	Unit 3	All Others
Accounting/Budgeting				
Facilities/Property Inventory				
Personnel within the SDE				
Personnel Statewide				
Pupil Files				
Program Management and Monitoring				
Test Processing and Reporting				
Federal Reporting				
Other				
	100%	100%	100%	100%

35. In almost all state education departments, some of the data processing is handled manually. Please estimate the percentage handled manually for each function. (Note that the percentages for each function should add to 100.)

Function	% Automatic Data Processing	% Manual	
Accounting/Budgeting	_____	_____	100%
Facilities/Property Inventory	_____	_____	100%
Personnel within the SDE	_____	_____	100%
Personnel Statewide	_____	_____	100%
Pupil Files	_____	_____	100%
Program Management and Monitoring	_____	_____	100%
Test Processing and Reporting	_____	_____	100%
Federal Reporting	_____	_____	100%
Other	_____	_____	100%

36. Indicate your plans for the future in regard to automatic and manual data processing listed in question 35 by checking the appropriate spaces below.

Function	Leave About the same	Want Greater Automation	Want Less Automation	Planning Change	Implementing Change
Accounting/Budgeting					
Facilities/Property Inventory					
Personnel within the SDE					
Personnel Statewide					
Pupil Files					
Program Management & Monitoring					
Federal Reporting					
Other					

37. Briefly describe any plans or developments leading towards establishing of regional data processing centers that will complement the department's data processing capability.

38. a. Are any of your data management activities handled under contract?

_____ Yes _____ No

- b. If "yes," please list the activities which are contracted, and estimate the proportion of each activity handled in this manner.

Activity	Proportion under Contract

39. a. Did you purchase or rent an existing data management software system for use in your automatic data processing?

_____ Yes _____ No

If "no," skip to question 43.

If "yes,"

- b. Did you purchase it or rent it?

_____ purchase _____ rent

- c. From whom did you secure it? _____

- d. What is it called? _____

40. a. Please estimate the total cost of purchasing or renting the system to your operation. _____

b. Please estimate the costs of adapting the system to your operation.

41. Please indicate the overall success you have had in adapting and using the software system

_____ Very high success
_____ High success
_____ Moderate success
_____ Little success
_____ Very little success

42. Please list briefly any special problems you have had in adapting and using the software system.

43. a. Do you have special software packages, special coding procedures, or other components of your data processing system which are adaptable and which you would recommend to a person in another state?

_____ Yes _____ No

b. If "yes," please list the components you would recommend.

44. Are you or members of your staff available to help in adapting one or more of these components to another system?

_____ Yes _____ No

V. INFORMATION DELIVERY (OUTPUT)

Generally, information systems across the nation have not achieved complete success because, for one reason or another, they have failed to supply information needed by users at the right time or in the best form. Different ways of handling the information system-user interface have been tried. We are interested in your experiences in this matter and your thoughts about how it can best be handled.

45. Please indicate the manner in which information is delivered to different users in your system by checking all appropriate items.

	Written Reports	Information Center	Personal Contact with Information Specialist	Other Personal Contact	Other (Specify).
State Superintendent	_____	_____	_____	_____	_____
Deputy Superintendent	_____	_____	_____	_____	_____
Other Top Management	_____	_____	_____	_____	_____
Middle Management	_____	_____	_____	_____	_____
Line Management	_____	_____	_____	_____	_____
LEA's	_____	_____	_____	_____	_____
Legislative Users	_____	_____	_____	_____	_____
Other State Government functions	_____	_____	_____	_____	_____
Federal Users	_____	_____	_____	_____	_____

46. What degree of success do you feel you attain in supplying needed information to each of these groups?

	Very High Success	High Success	Moderate Success	Low Success	Very Low Success
State Superintendent	_____	_____	_____	_____	_____
Deputy Superintendent	_____	_____	_____	_____	_____
Other Top Management	_____	_____	_____	_____	_____
Middle Management	_____	_____	_____	_____	_____
Line Management	_____	_____	_____	_____	_____
LEA's	_____	_____	_____	_____	_____
Legislative Users	_____	_____	_____	_____	_____
Other State Government functions	_____	_____	_____	_____	_____
Federal Users	_____	_____	_____	_____	_____

47. In your experience, how difficult is it to attain each of these characteristics to a satisfactory level in information system output?

	Almost Impossible	Very Difficult	Fairly Difficult	Not Very Difficult
Accuracy (correctness)	_____	_____	_____	_____
Timeliness: delivery when user needs it	_____	_____	_____	_____
Clarity to user	_____	_____	_____	_____
Format: assurance of maximum communicativeness	_____	_____	_____	_____
Content according to user needs	_____	_____	_____	_____
Comprehensiveness <u>all</u> persons who need an item of informa- tion receive it	_____	_____	_____	_____
Other (specify)	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

48. Has there been a formal evaluation of your information system and its output within the past 12 months?

_____ Yes _____ No

If "yes,"

a. Who conducted the evaluation?

b. How useful were evaluation results to you in planning system refinements?

_____ Highly useful
 _____ Moderately useful
 _____ Not very useful

c. Based on your own experience, how often do you recommend that formal information system evaluations be conducted?

_____ Continuous evaluation
 _____ Two or three times a year
 _____ Once a year
 _____ Less than once a year
 _____ Other (specify) _____

49. Handling of requests for unscheduled information (information which has not previously been scheduled to be produced in the manner requested) is a difficult area for most information systems. Please indicate the regularity of requests for unscheduled information received from each of the following and percentage of requests filled:

		About Once					% Of
	Daily	About One A Week	Every Two Weeks	About Once A Month	Occasion- ally	Never	Requests Filled
State Superintendent	_____	_____	_____	_____	_____	_____	_____
Other Top Management	_____	_____	_____	_____	_____	_____	_____
Heads of Instructional Divisions	_____	_____	_____	_____	_____	_____	_____
Administration and Budgeting	_____	_____	_____	_____	_____	_____	_____
Voc. & Tech. Education	_____	_____	_____	_____	_____	_____	_____
Special Education	_____	_____	_____	_____	_____	_____	_____
Legislature	_____	_____	_____	_____	_____	_____	_____
Other State Govern- ment	_____	_____	_____	_____	_____	_____	_____
LEA's	_____	_____	_____	_____	_____	_____	_____
Other (specify)	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

50. a. What types of unscheduled requests are you most successful in handling?

- b. On the average, about how many days elapse between receipt of requests you are most successful in handling and the delivery of the information requested?

_____ Days

51. a. What types of unscheduled requests are you least successful in handling?

- b. On the average, about how many days elapse between the receipt of requests you are least successful in handling and the delivery of the information requested?

_____ Days

53. Please estimate the percentage of federal reporting handled by your information system and by other means. Note that the percentages should add to 100.

_____ % from information system.
_____ % from other SDE units
_____ % directly from LEA's.
_____ % other

100 %

54. Please discuss briefly any other ideas you have on ways to increase success in providing information to different users--and which you feel would be useful to a person in your position in another state.

Please return the completed questionnaire immediately.

Thank you.

APPENDIX B

KEY RELATING QUESTIONNAIRE TO
SECTIONS OF THE PAPER

Questionnaire Numbers Which Provide Data

II. Introduction to Information Services

- 1 The degree of centralization of IS
- 2-4 Presence or absence of an MIS unit, either planning or operational or both
- 6 Goals and objectives of the unit
- 5 Location of the unit in SDE structure
- 7 Personnel
- 8 Budget
- 9 Level of support
- 10 Competencies necessary for leadership of information systems
- 11 Problems involved in development

III. Planning and Implementation

- 12 Responsiveness to management
- 13,16 The type and extent of planning
- 14,15; Personnel involved in planning and operation
17-20;
25
- 21-24 The nature and content of training and/or orientation

IV. Data Collection

- 27,28; Forms Control
29
- 26 Duplication of data
- 30 Burden on the sources
- 32 Editing
- 31 Quality control

V. Data Processing

- 33 Number of units performing data processing
- 34 Percent of budget devoted to the various functions
- 35 Percentages of manual and automatic data processing for each function
- 36 Plans for change in Automatic Data Processing
- 38 Use of contractors for Data Management
- 39-44 Software system
- 37 Regional Centers

VI. Information Delivery

- 45 Types of information delivery
- 46 Degree of success in supplying information
- 47 Quality of output
- 48 Evaluation (in the last year)
- 49-51 Unscheduled requests
- 52 Scheduled reports
- 53 Federal reporting
- 54 Ways to increase success of information services

APPENDIX C
DEFINITION OF TERMS

ADP (Automatic Data Processing)—Data processing performed largely by automatic means, i.e., by a system of electronic or electrical machines which require little human assistance or intervention.

Burden on the Sources—The expenditure of time and energy required by those who supply data for the information system; this task often means filling out forms.

Coding—(1) An ordered list or lists of the successive instructions which will cause a computer to perform a particular process. (2) The act of preparing a coding.

Data—That which is fed into the system.

Data Base—Data items that must be stored in order to meet the information processing and retrieval needs of an organization. The term implies an integrated file of data used by many processing applications in contrast to an individual file for each separate application.

Data Capture—Collection of source data which will be put into the system.

Data Collection—The total process of getting data from the source to the data processor.

Data Management Subsystem—The subsystem of the total IS in which data are classified, processed, stored in appropriate files, analyzed, and manipulated in various ways and fed to the output subsystem.

Decoding—The reverse of encoding.

Duplication of Data—Unnecessary capture of source data.

EDP (Electronic Data Processing)—Data processing performed largely by electronic equipment, such as electronic digital computers.

Editing—Checking the source record to make sure that source data is complete and valid before it is encoded.

Encoding—Translating data from decimal form into binary coded character form.

Forms Analysis—Study of the forms used to collect source data to determine the nature of the source data being collected, frequency, distribution, duplication, etc.

Forms Control—An attempt to control the nature of source data coming into the IS by having all forms used to collect it approved by a central authority.

Hardware—The machinery used in operating IS.

Information—That which comes out of the data management subsystem; source data after data processing; the meaning or intelligence derived from data.

Information Delivery—That part of output subsystem in which information is made ready to be delivered to users; the actual delivery.

Information Services—The total processes and products involved in obtaining and storing data and delivering it to users.

Information System—A formal configuration of human and capital resources and programs that results in collecting, encoding, storing, processing, retrieving, communicating, and decoding data.

Input Subsystem—That system in which raw data from the field are collected; checked for completeness, validity, and reliability; and fed into the data management subsystem; data collection forms are a part of the input subsystem, and this subsystem provides the MIS-source interface.

Inquiring—Requesting information from storage system.

Interface—The boundary between a computer and its users.

Management Information System—An information system designed and used to provide information for management decision and control.

Output Subsystem—That system in which information is retrieved from the data management subsystem, placed in proper format, and fed to the various users; this subsystem provides the MIS-user interface and thus is crucial in determining impact of the MIS on various decision processes.

Quality Control—Attempt to insure that source data fed into the system is accurate and complete, e.g., checks on coded data for accuracy and completeness, checks for error sources during editing, feedback from source personnel, machine checks on data.

Regional Centers—Information system outlets scattered through a state or region for use of local agencies.

Software—A collection of programs and routines associated with a computer which facilitate the programming and operation of the computer.

Source Data—That which is collected from the person(s) or place(s) of its origin to be fed into the information system.

System—A set or arrangement of entities that forms, or is considered as, an organized whole.

Unscheduled Requests—Inquiries for information not produced in regularly scheduled reports.